Pit and Quarry

SAND · GRAVEL · STONE
CEMENT · LIME · GYPSUM

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Pit and Quarry

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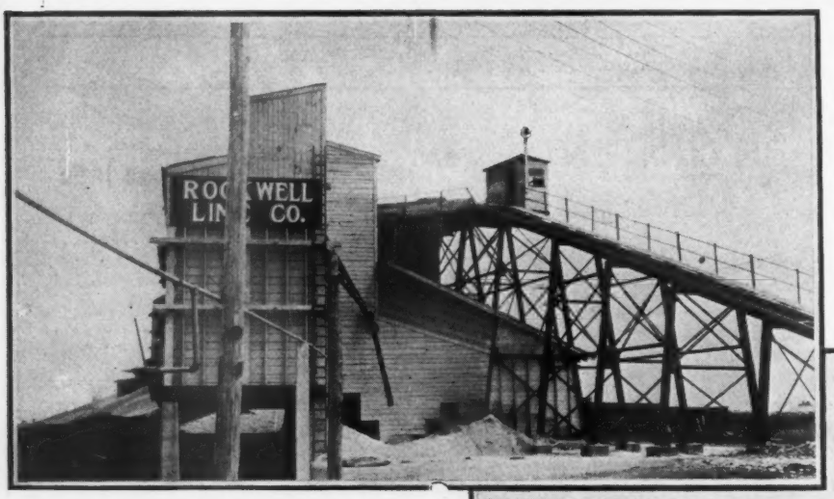
YOUR DRILL INVESTMENT FIFTEEN YEARS FROM NOW!



TRADE MARK
CYCLONE DRILLS
A PLEDGE OF SERVICE

Above is shown the crusher plant at the Rockwell Lime Co., Francis Creek, Wisconsin. The photograph at the right shows the south side of this unusually interesting quarry which employs a Cyclone in drilling operations. The present quarry occupies an area of about 6 acres with a face of about 28 feet.

The Rockwell Lime Company of Francis Creek, Wisconsin, have the product that is acknowledged to be the best substitute for imported Vienna lime. This company is also distinguished for its efficiency and discriminating choice of equipment.

Back in the early part of the year 1913, they bought a Cyclone Drill. In a lime plant quarry the rock requirements are usually limited and a small well drill was installed—not the regular No. 14 Cyclone Big Blast Hole Drill usually recommended for quarry work. This drill has been putting down 5" holes 15 feet from the face and one 16 foot centers, for nearly fourteen years and it will still give a number of years of good service.

In later years, the Cyclone line of Big Blast Hole Drills has been augmented by two additional sizes, the No. 14 Junior and the No. 14 Super, respectively smaller and larger than the No. 14 Standard, the original Cyclone Big Blast Hole Drill. For plant production the size of that required by the Rockwell Lime Company, we now recommend the No. 14 Junior, which is stronger, more substantial and better adapted to quarry work than the small well drill which they bought.

As yet, there is no standard by which the life of a Cyclone Blast Hole Drill may be gauged. Many have been in continuous operation for over seventeen years. Our book, "Big Blast Hole Drills" tells the story of well drilling for quarry work from its very beginning and it is a useful reference book. Ask for a copy.

The Sanderson-Cyclone Drill Company

Orrville, Ohio

SANDERSON·CYCLONE·DRILLS

Pit and Quarry

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TOO MANY RULES AND REGULATIONS

SAFETY is a vital problem in the operation of a plant. Too much emphasis cannot be laid on the importance of maintaining high standards of accident prevention. A large measure of safety, however, is not always attained by too many rules and regulations, or by too many signs indicating danger. The old saying that familiarity breeds contempt is pertinent to this question of safety warnings. A plant which has few placards often has a better safety record than one which is encumbered with signs. Workmen soon ignore warnings with which they are familiar especially if these signs are seen too frequently and in places where there is no great need for them. Hence, it is important that care and wisdom be used in determining where danger signs should be placed, how often they should be changed, and how they should be worked. Variety in the kind of warnings and effectiveness in placing them will accomplish far more than glaring signals which soon become common place and sometimes obsolete.

Safety cannot be secured by signs only. They have little effect unless they are developed out of an intelligent and thorough safety program which is a part of the policy of the management. There would be little use in warning a blind man to look both ways while crossing a street. Workmen who are not trained in the ways of safety are practically blind as far as signals are concerned. It is only after everything possible has been done to make equipment and method as nearly fool proof as possible that the training of the men should begin. Installation of guards and safety devices, maintaining up-to-date facilities for repairing machines, and assigning men to work for which they are suited are the first steps in an accident prevention program. Constant effort to educate along lines of accident prevention is essential to success. In many plants a safety program carefully planned and effectively carried out has resulted in a reduction of accidents to a very remarkable degree. Leaders in industry are giving their best efforts to this highly altruistic problem.

The rapid progress toward accident reduction which has been made during the past few years gives promise of remarkable changes during the next decade. The work of the National Safety Council cannot be too highly commended. The leaders of this movement merit the gratitude of everyone concerned with industry. The organizations which have wholeheartedly entered into the plans for securing safety among their employees, and the employees themselves, carrying out the program for safety, stand out as vital factors in this splendid achievement. The work has been carefully planned and effectively carried out. The practical aspect of the subject of accident prevention has been stressed. The movement is based on sound scientific and economic principles with business acumen apparent on the part of the leaders.

The most important phase of the problem of safety is the human machine. Men are not automatons; they are as variable and changeable as the weather. A danger signal which will serve its purpose with one group will fail with another; one which is effective today has lost its significance tomorrow. It is certain that workers will not always observe and obey warnings. It is highly desirable that habits of caution be developed. Constant repetition of course of action will create habit. Hence, foremen should give special attention to new men in an effort to get them started in the habit of obeying orders and signals. While the habit must be invariable, the method of making permanent the habit should be one of infinite variety. The signs and warnings should be frequently changed and varied; they should appeal to various qualities of mind. Signs which convey ideas or explanations appeal to the intelligence of the men, stimulate their alertness, and increase their caution. Brief and striking statements or placards are effective. Warnings cleverly worded and attractive to the eye bring results. Suggestions to a man's intelligence rather than to his sense of fear are useful.

Safety is profitable. Accidents are expensive. While safety measures are altruistic, they are also of sound practical value. We have in former editorials discussed the problems of the cost to management of accidents, both from the standpoint of actual compensation to the worker and from the angle of the slowing up of production. Workmen can be impressed with the fact that accidents are a loss to management and to themselves also, whether they are the actual victims of the accident or not. Everyone in the organization is affected by any

cause which is deterrent to production. If intelligent workmen are kept informed on the subject of general loss due to accidents, they will increase their efforts to prevent trouble. There is in every human beings an innate belief that lightning will not strike him; that he will come through safely. This explains, of course, the risks which men take with confidence of success. That feeling is instinctive and valuable but should be inhibited to the extent of conviction that "playing safe" is a matter of common sense and good judgment. In every plant care should be taken that danger signals and warnings are not so commonplace and ineffectual that they are of no real value.

SUGGESTIONS FROM EMPLOYEES

COOPERATION between all members of the organization is of practical value to the management. Useful suggestions often come from the workmen; their ideas are worth consideration. A well developed method of receiving and considering ideas of employees prevents waste of time and assures utilization of such suggestions as have practical value. A healthy, flourishing suggestion system is frequently a means of reducing costs, of increasing production, and of improving the quality of the product. Some of the best contributions to management have come from employees whose recommendations were based on a shrewd knowledge of the process, a loyal desire to be of service, and a friendly spirit of cooperation. Such workmen are better workmen because of this outlet for their opinions. Growth stimulates growth. Ideas worked out and accepted for what they are worth lead to other ideas of increasing value. A man who is thinking in terms of the future is a more valuable workman than one who is mentally stagnant. The fact that the man is thinking is significant.

Of course, there is the possibility of encountering a nuisance with suggestions. There is always the chance that the man will show up who is forever suggesting impractical and worthless changes. He is of no value in any capacity and unless properly handled may prove to be a menace. Such an individual, however, is not more likely to be present in an organization where suggestions are encouraged and recognized. He is the sort of pest that is found anywhere regardless of management policies. In fact, he can be more easily controlled in an organization where cooperation is stimulated. If his ideas can be utilized, there is the proper channel for them to follow. If they are worthless, there are many possibilities for shelving them without arousing antagonism and ill will.

Stimulating the habit of thinking among employees is likely to serve a practical purpose. There are many possibilities for constructive criticism and helpful opinion. Improvement of methods ought to interest any intelligent workman. He is close to the job and aware of many seemingly small details which might be changed and improved. His outlook is necessarily limited; he may not grasp the big problems. The small matters are consequential, however, and bear a crucible relation to the whole process of production. Increasing production is the most important problem of management. Production after all comes from the workman. If he understands the relation of production to his own well being, he will be alert for any innovation which is valuable. Accident prevention is his own problem and should be impressed on him as a responsibility. Suggestions from him ought to be both practicable and satisfactory. Improvement in the quality of the product requires a more careful study than the ordinary workman can give to the problem. There is, however, an occasional instance of a man who has a sense for that sort of suggestion. Especially among men who have long been working with the same company there is sometimes one who can work out sound and valuable suggestions concerning a better product.

The ways in which employees may aid management are so numerous that they pertain to every phase of production. One of the most profitable schemes for advertising a certain well known product came from an obscure worker whose interest in his job led him to spend his time on the problem of advertising. Certainly if the product has merit, the employees know it; if it has no merit, it is not worth advertising. Salvaging or reclaiming waste material is another subject on which employees could well spend thought. No phase of production is more important or practical for consideration. One of the most helpful lines of constructive thought for employees is that of increasing cooperation in the plant. Foremen may well look to the workers for aid in ironing out difficulties, eliminating friction, and bringing about a fine state of mutual helpfulness and good spirit. There is more wasted energy both physical and mental than most executives are aware of, and it should be utilized to the advantage of every member of the organization.

There are various ways in which a policy of suggestion encouragement may be maintained. Proper recognition of valuable ideas should, of course, be made. In case of unusual and immediate financial returns from an idea, rewards of a practical nature are equitable. The integrity of the executive will guarantee suitable recognition of such services. Assuming that the man's ideas belong to the company without special evaluation of their worth is a policy which will defeat any good effects of a system of suggestions from employees.

MINING ASBESTOS ON A LARGE SCALE

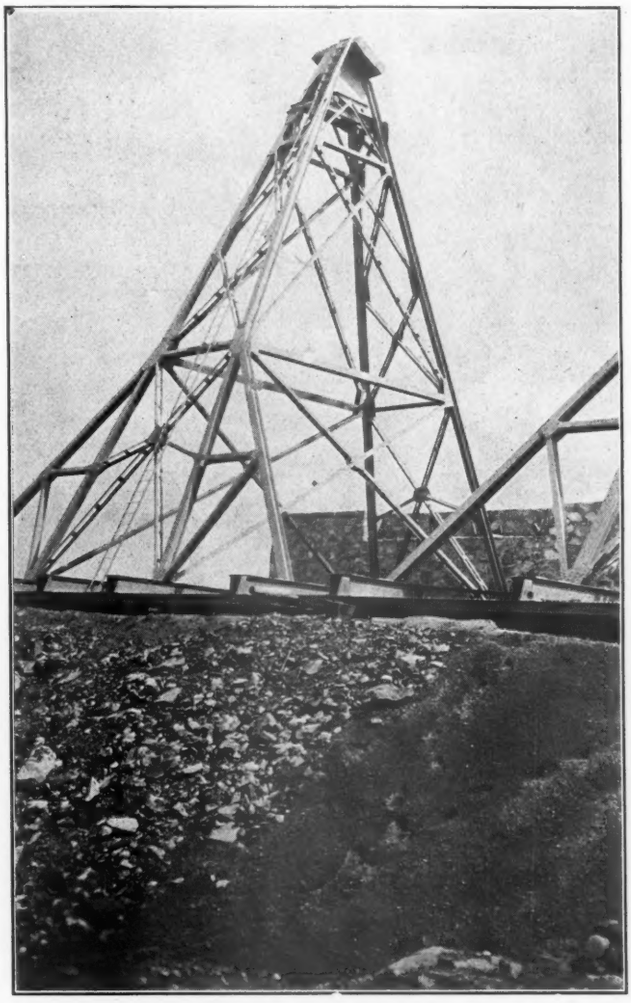
By F. A. Westbrook

THE Asbestos Corp., Ltd., of Thetford Mines, Quebec, carries on about ten different operations in the vicinity of Thetford Mines. These consist of quarries, or mines, each provided with its own mill. They are all of large size, well organized, efficiently operated and of interest to all quarrymen. This is true, in spite of the fact that asbestos mining is done in a closely circumscribed area. There are certain things common to all quarrying and where these are carried out by the highly developed methods employed by this company, there is bound to be much of vital interest to all.

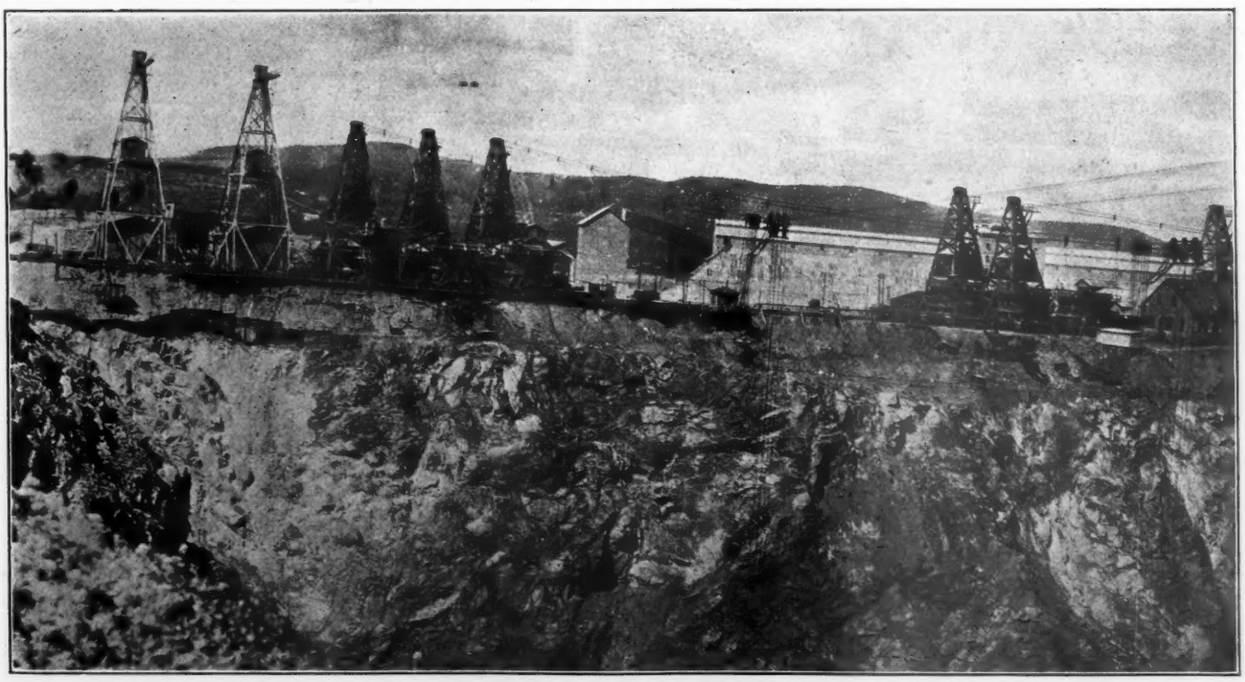
As it is obviously impossible to describe all of the different operations of the Asbestos Corp. within the space of a single article, one complete production unit has been selected, namely, the King Mine. This consists of a pit 350 feet deep and covering about 15 acres at the present time. The property covers several times this area.

Towers

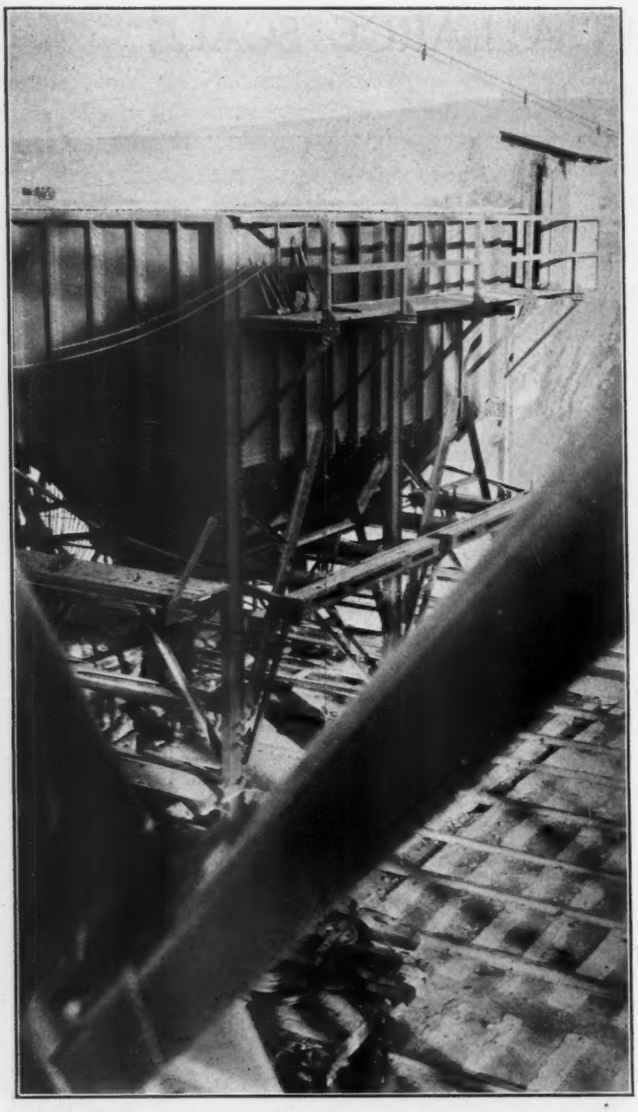
Of course, the most striking feature about a large quarry of this kind is the enormous towers located on each side of the pit opening and between which the cableways are stretched. There are six pairs of wood towers and two pairs of new steel towers, the latter almost ready for operation. Both the head and tail towers travel on rails, so that the skips which descend from the cableways may be lowered to any point where rock is being taken out. The spans between the wood towers are 937 feet. The head towers are 75 feet high and the



One of the New Steel Tall Towers



Looking Across the Pit Showing New Steel Head Towers with Plant in Background



Steel Rock-Bin Associated with New Towers—Signal Man's Cabin at Right

tail towers 45 feet. The wire rope stretching between them is 2¾ inches in diameter. The skips are designed to carry 5 ton loads. The head towers have a large hoist installed, driven by 200 h.p. 2200 volt Canadian General Electric induction motors. The hoisting engine is of the triple drum type, equipped with solenoid brakes.

These wood towers, with their equipment, were record breakers in their day, but the two new pairs of steel towers are designed for operations on a much larger scale. They are present day record breakers. The quarry has been made as deep as practicable for the width at the top, which is rapidly approaching the limit of the 937 foot span between the old towers. Therefore, as it is desirable to widen the area of quarrying as well as the depth, it has become necessary to increase the span between the towers. This is the reason for the new steel towers which have been installed for use over the deepest part of the quarry, where an increased length of span has become necessary before operations can be continued efficiently at this point. It will not be necessary to replace the remaining wood towers for some time to come, as the depth under them has not yet reached the limit imposed by their length of span.

Of course, the new steel towers embody several marked improvements over the old ones. In the first place, the head towers are 100 feet high, the tail towers 55 feet high, and the span 1,400 feet. The towers were made by the Dominion Bridge Company from Asbestos Corp. designs. The cableway consists of wire rope, made by the Dominion Wire Rope Company, 3 inches in diameter. The hoisting equipment, supplied by the Canadian Ingersoll-Rand Company, is of the very latest de-

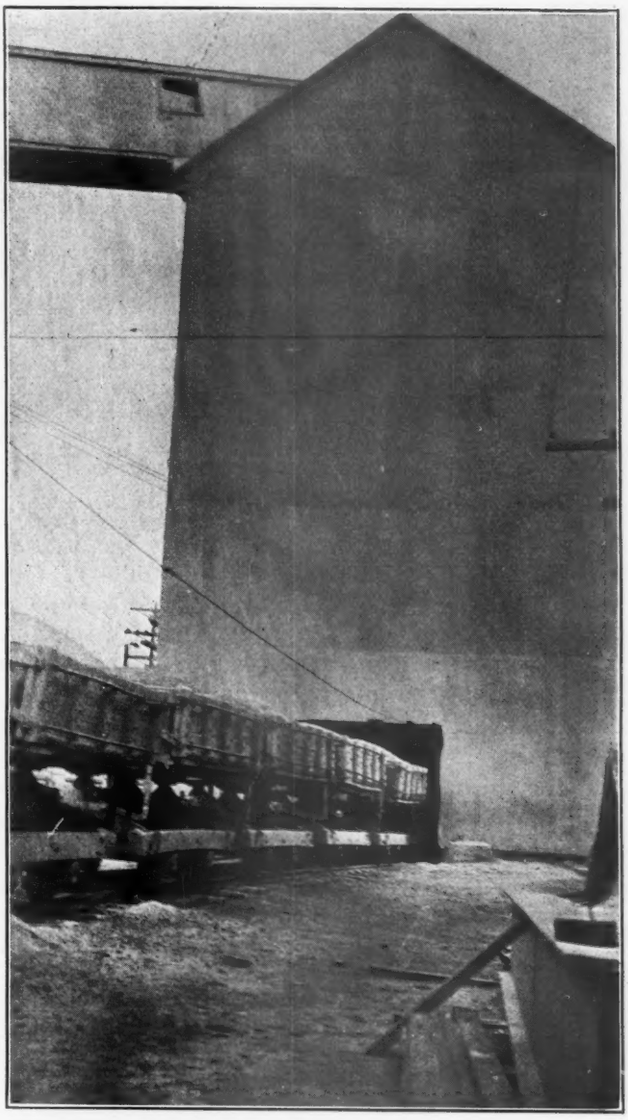
Train of Dump Cars Hauled by Electric Locomotive Dumping Mill Rock at the Primary Crushers

sign. It consists of a triple drum hoisting engine driven by a 450 h.p., 2200 volt, General Electric induction motor. The control for setting and releasing clutches and brake bands is by means of compressed air. The simple control levers are located at the top of the head towers. This equipment is designed to handle skips carrying 10 tons.

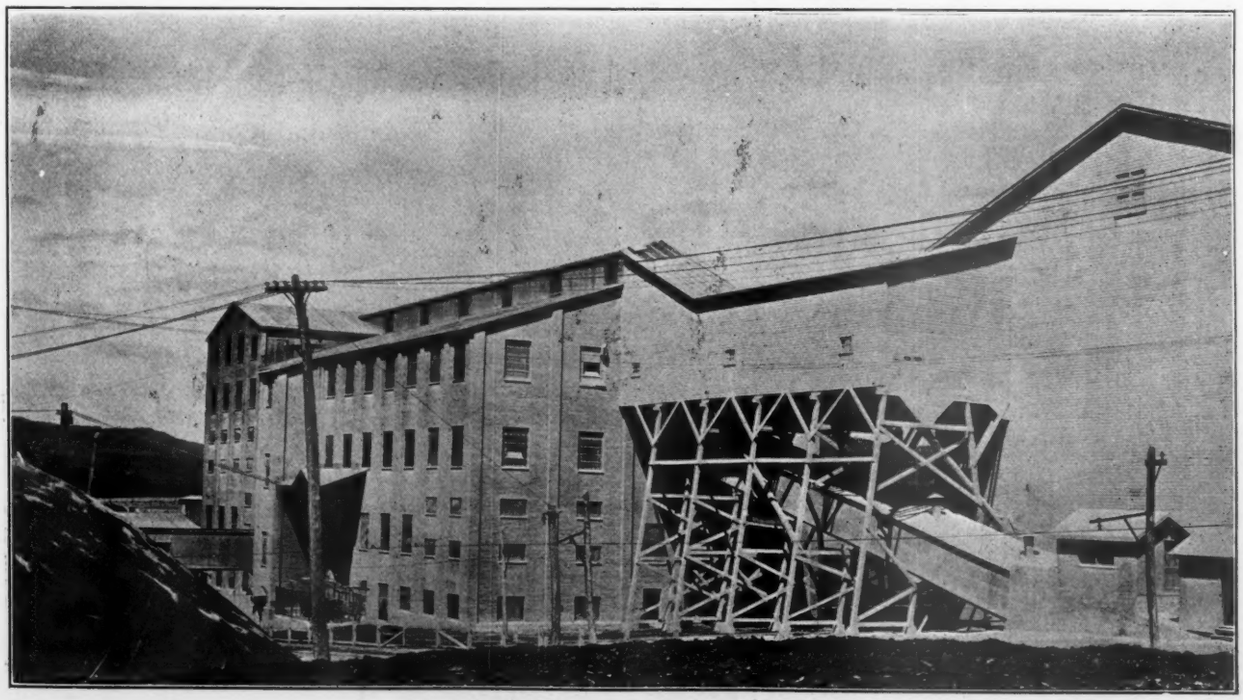
Associated with each head tower is a rock bin which is moved separately, when the towers are moved, so as to be under the cableway and into which the rock hoisted up from the quarry is dumped. The two bins associated with the steel towers are of steel but the bins used with the wooden towers are wood. Each bin is partitioned into two pockets, one being for barren rock, the other for mill rock. Trains of dump cars, hauled by Canadian General Electric Company electric locomotives with overhead trolley, are pushed under the bins for loading from air operated gates. The six rock bins are distributed between several different lines of track so that the trains will not interfere with each other. Thus it is possible to keep up a continuous flow of mill rock to the primary crushers and keep the barren rock pockets clear by hauling off their contents to the dump as rapidly as it accumulates.

Quarry

Before describing the milling processes, we will discuss how the quarrying is carried on. In the first place, drilling is done by means of Ingersoll-Rand piston drills. The face of the quarry is worked in steps or benches and the blasting is done by rows of holes parallel to the face in combination with horizontal holes or "lifters." Fifty and 60 per cent cxl dynamite is used. The large



Sand Bin Where Waste from Mill is Accumulated by Elevator Entering at Top



View of Mill Showing Conveyor Entering from Rock Storage House.

View Showing Cableway and Skip in Background with a Carriage Lowered for Repairs in Foreground

blocks are then drilled with Ingersoll-Rand jack hammers.

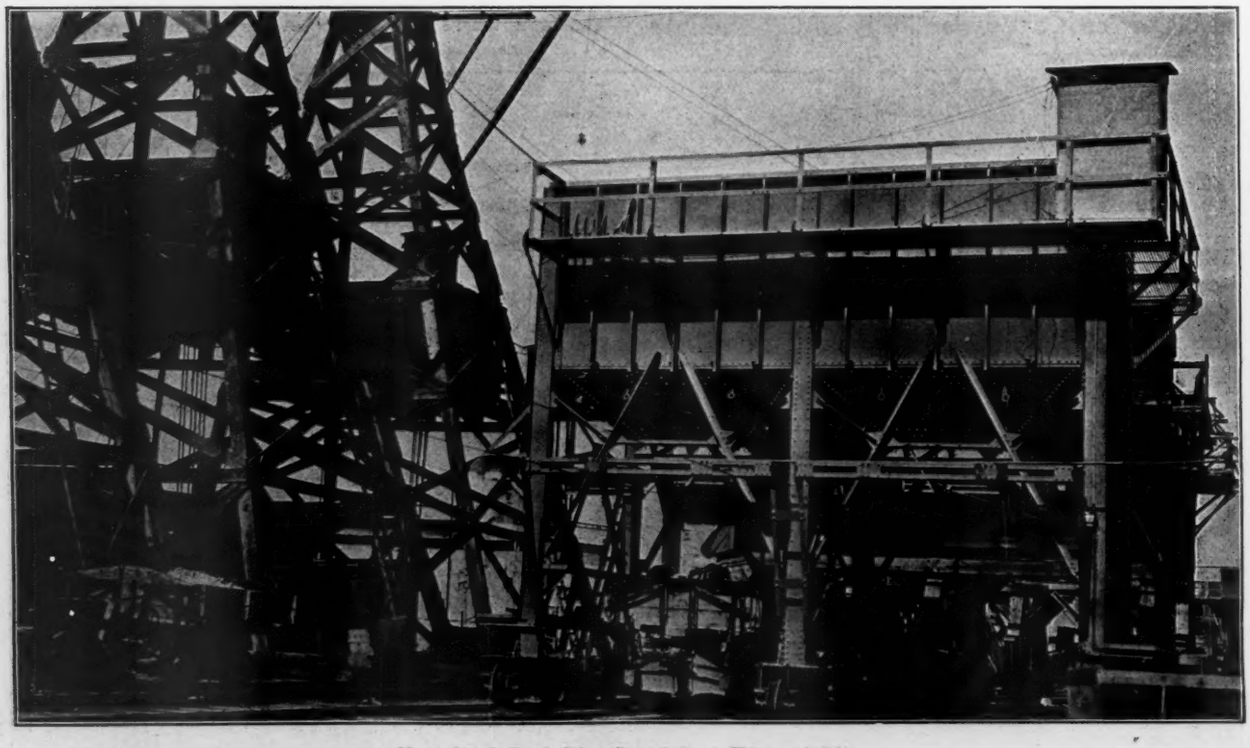
The rock is sorted by hand in the quarry into three grades, barren, mill and "crude." The barren rock and mill rock is taken up on skips and dumped into the rock bins already described. The mill rock is always placed in the pocket of the bin farthest from the quarry, the barren rock in the other pocket. This facilitates their future disposal and renders mistakes unlikely. The "crude" consists of the highest grade, long fibered asbestos, which occurs plentifully and does not need milling. This grade is taken out by hand and placed in hand barrows and dumped into skips. When a load has been accumulated, it is dumped into a car at the surface and taken to the cobbing department. Cobbing simply consists of pounding the lumps of fiber with a hammer and picking out the grit. It is an operation which can be done with great speed. There are something like twenty men in this department. After this, the asbestos is screened once to remove grit, after which it is ready for bagging.

Signals controlling the operation of the skips are given manually in the pit to a man at the surface. The latter signals to the engineman in the head tower of the cableway by electric bell. The head and tail towers are moved, when necessary, by hitching a hoisting cable around a block and winding up the hoisting drums. The associated rock bin is moved on its track by one of the electric locomotives. Compressed air for the outside plant is supplied by a 28 by 18 by 36 inch, two stage Canadian Rand Drill Company compressor. This is operated by means of rope drive by a 600 h.p. Canadian General Electric Company 2200 volt synchronous motor. This outfit has seen many years of service and is still giving satisfactory results.

Crushing

The crusher house and mill constitute one of the most up-to-date well laid out industrial plants which I have seen. It is completely electrified, very fully mechanicalized and remarkably clean. Before discussing these features, however, from the management viewpoint it will be preferable to describe the serial operations followed in this department.

As already stated, the mill rock is brought from the bins in trains of side dump cars, made at the plant, and hauled by electric locomotives, operating on 42 inch gauge tracks. These dump cars are held in position by chains which are unhooked by hand. After discharging the material, the cars



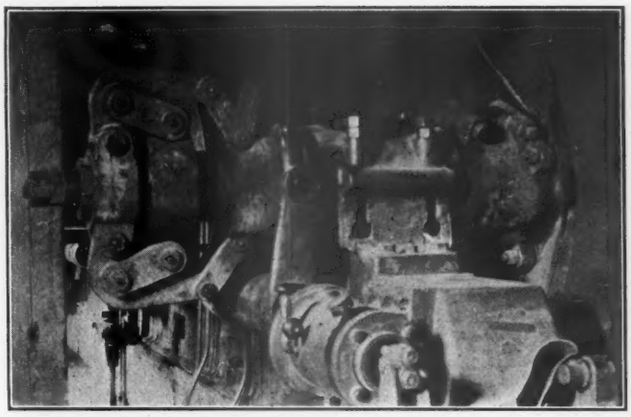
New Steel Rock-Bin; Located at Edge of Pit

being turned back into a horizontal position by a third rail, the chains are again hooked by hand.

There are two primary jaw crushers placed side by side into which the mill rock is dumped. In fact, there are two parallel milling units throughout the mill and what is said of one applies to the other. At only one point, as will be explained, does the material from the two units come together. The primary crusher is a 36 by 42 inch Canadian Ingersoll-Rand of the jaw type. The rock is fed into it through finger gates. The crushed rock is then carried by a 42 inch picking belt to a Sturtevant roll crusher. The material is then taken by an elevator to the hammer crusher, made at the plant, and from this by an elevator to the dryers. These dryers are vertical, made by the company, heated by furnaces burning buckwheat coal using forced draft. The crushed stone and fiber is dumped in the dryer at the top from the elevators and its descent is retarded by grid baffles. By the time the material has reached the bottom it is usually dry.

The dry material is next taken from each of the two units by pan conveyors, made in the company's shops, which discharge into a 48 inch Jeffrey elevator. This delivers to a belt conveyor extending the entire length of the rock storage house. This is a long, relatively narrow, building having a storage capacity of 28,000 tons. The material is distributed evenly over it from the conveyor.

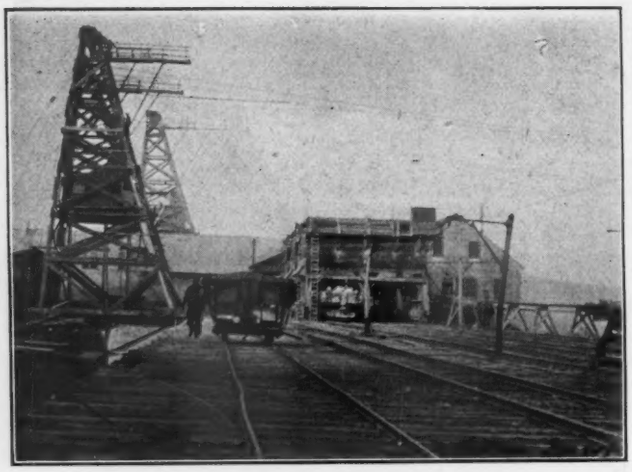
There are several reasons for having such a large storage capacity. In the first place, with this amount of surplus on hand, it is possible to keep the subsequent milling and screening operations going for some time, even if the quarrying and crushing operations should be held up by prolonged bad weather or serious mechanical breakdowns. This, of course, is important from the commercial standpoint, as delayed deliveries are always harmful to a producer's good will, no matter how good may be the excuses.



Part of the Hoisting Engine in Steel Head Tower

In the second place, the large storage capacity acts similar to a mixing chamber, helping to secure uniformity of the material which is to be drawn upon for subsequent operations. This is beneficial from the manufacturing standpoint. Another benefit to the manufacturing is the "seasoning" which the material receives in storage. By this is meant that at certain times, mostly due to weather conditions, the material comes into storage in a dryer condition than at other times. Thus the finely crushed stone which comes in dry and hot will dry out that which may come in the next day, for instance, in a slightly damp condition.

Dump Car Loading Under Rock Bin



View Showing Wooden Towers with Rock Bins and Crusher House in Background

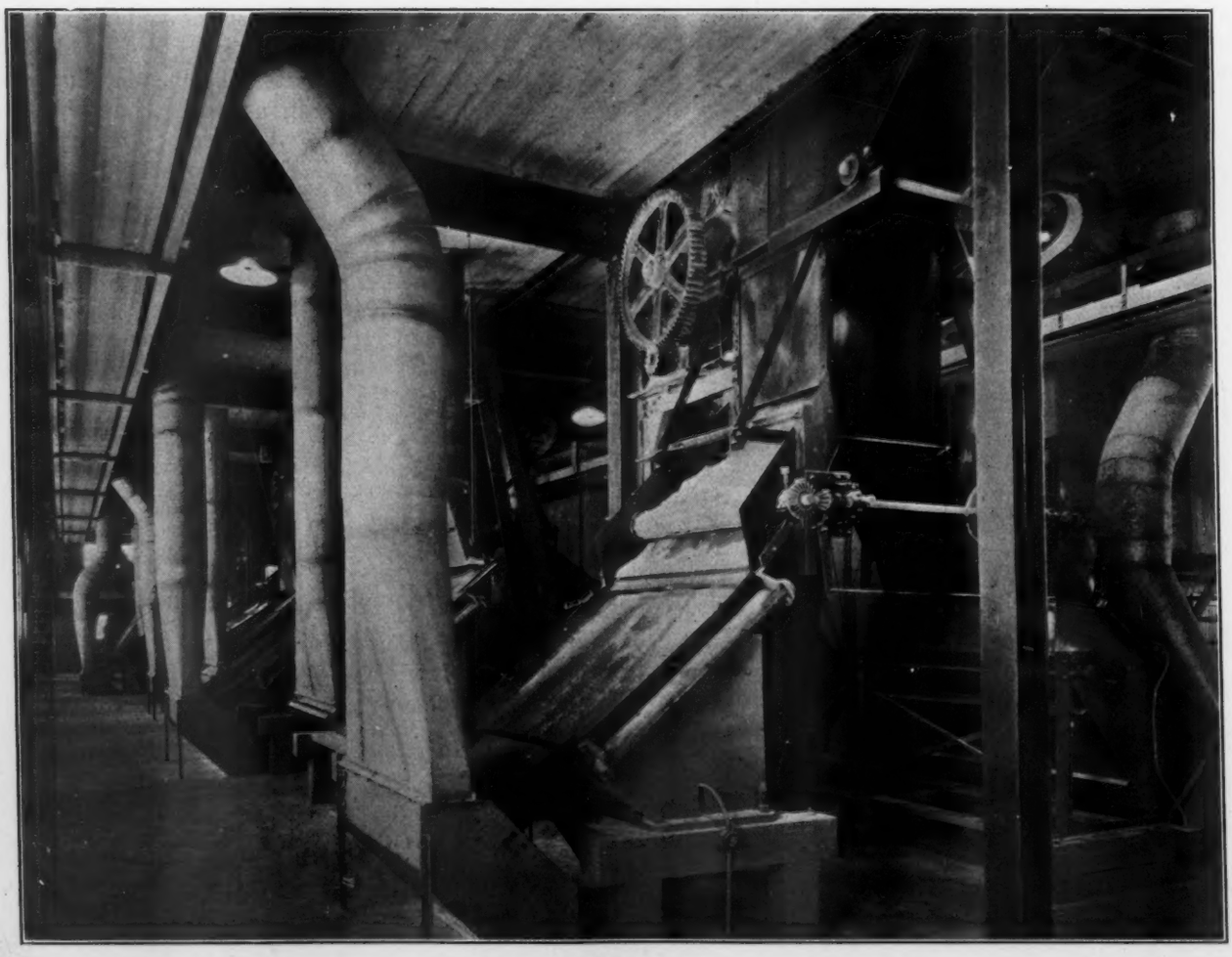
This "seasoning" not only facilitates manufacturing processes but also makes the thorough separation of the different lengths of fiber more sure and is therefore of importance commercially because it provides uniformity of quality more dependable. The rock storage house, therefore, forms a break between the quarry and the final manufacturing processes. This is an important factor in promoting uniformity of quality and continuity of production.

Mill

Material is fed to a large bin at the mill by a 20 inch belt conveyor from the bottom of the rock storage building. There is a series of openings at various points under the storage building so that the rock may be drawn off uniformly throughout its length. All material on the conveyor passes over an electric recording weighing machine made by Messiter Weighing Machine Company. This machine shows the total amount of rock used in 24 hours also the rate at which it is passing at any given time. This information enables the management to keep a close check on production and the percentage of asbestos which is being obtained as finished product.

In the mill, the processes are again carried on in two separate and complete units. The rock is first screened to take out the fines and long fibers which are removed by suction. The overs go to a hammer crusher and the throughs go to the sand belt for disposal as waste. This operation is repeated three times more, the fibers in each case being taken up by suction, the overs going through a hammer crusher and the fines dropping on the sand belt.

Several different types of screens are used. There are shaking screens, made in the company's



View of Vibratory Screens

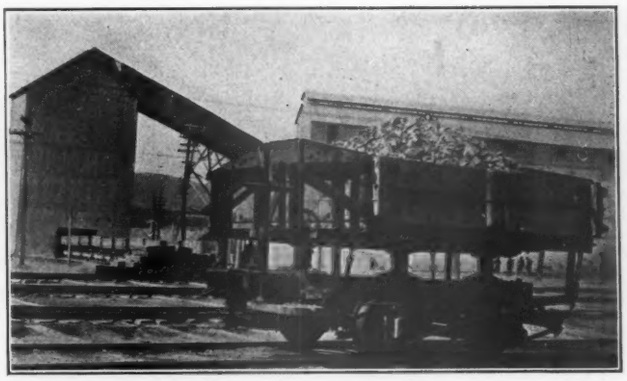
own shops, Mitchell electric vibrating screens, Hummer vibrating screens, and Sturtevant vibrating screens. The suction fans were mostly furnished by Sheldon, Ltd. The fibers which are taken up by suction are caught in Sheldon, Ltd., collectors, and are rescreened to remove sand. The fiber is then dropped to the graders. These are cylindrical rotating screens, made by the company. These screens deposit the various grades of fiber in separate compartments from which chutes convey the material to the bagging machines.

The baggers, made by the company, consist of air cylinders which force the fiber into the bags in a very compact form. There is a bag elevator and conveyor which carries the bags from the packing department of the mill over the railroad to the storage house, where they are loaded on freight cars.

The sand, or finely pulverized rock, which is separated at each screening and crushing operation is accumulated on the "sand belt" which takes it to an elevated storage bin, where it is loaded on dump cars and taken to the dump by electric locomotives.

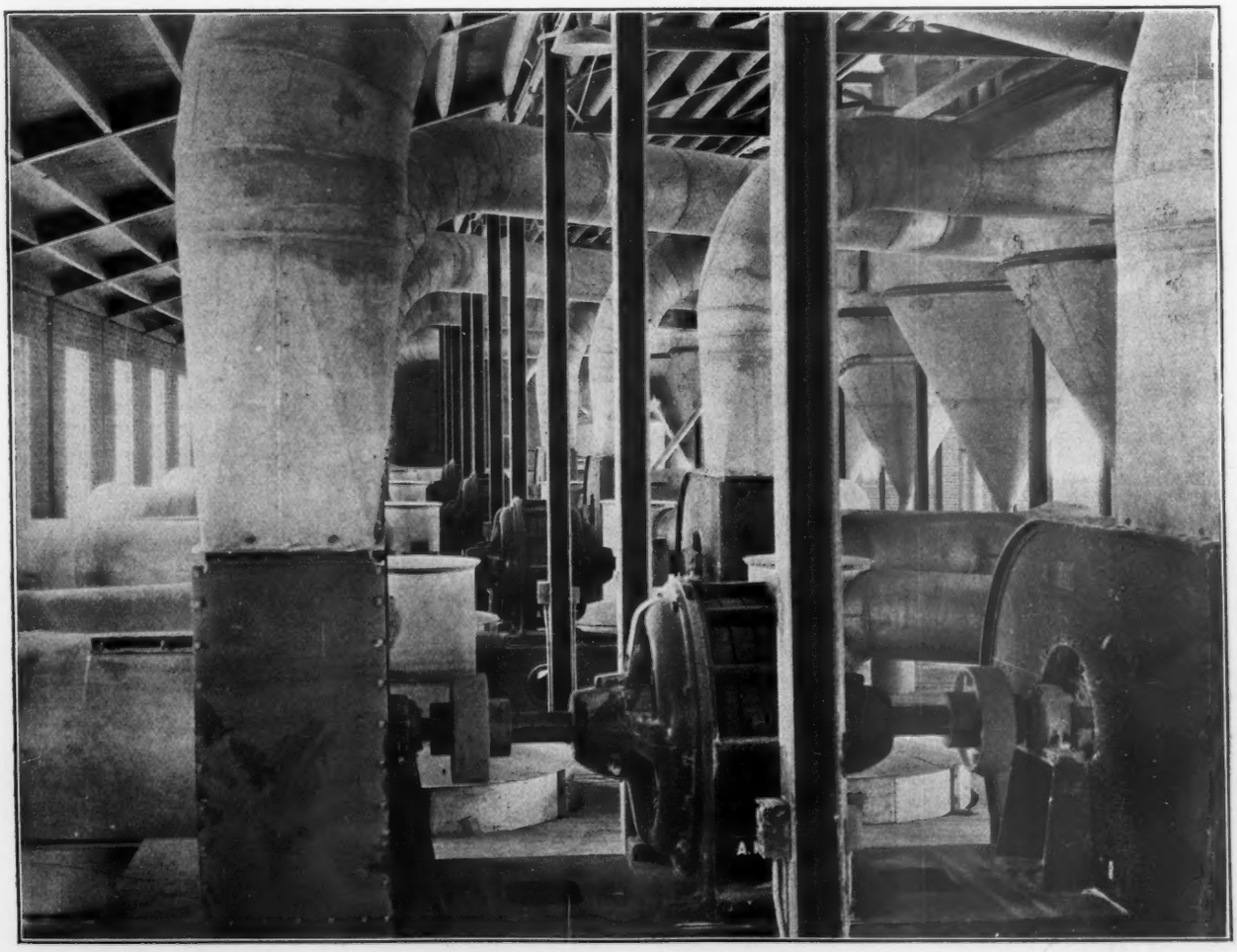
Electrical Equipment

Practically every machine has its individual electrical motor. These have push button one way controls so that the motors can be stopped from the



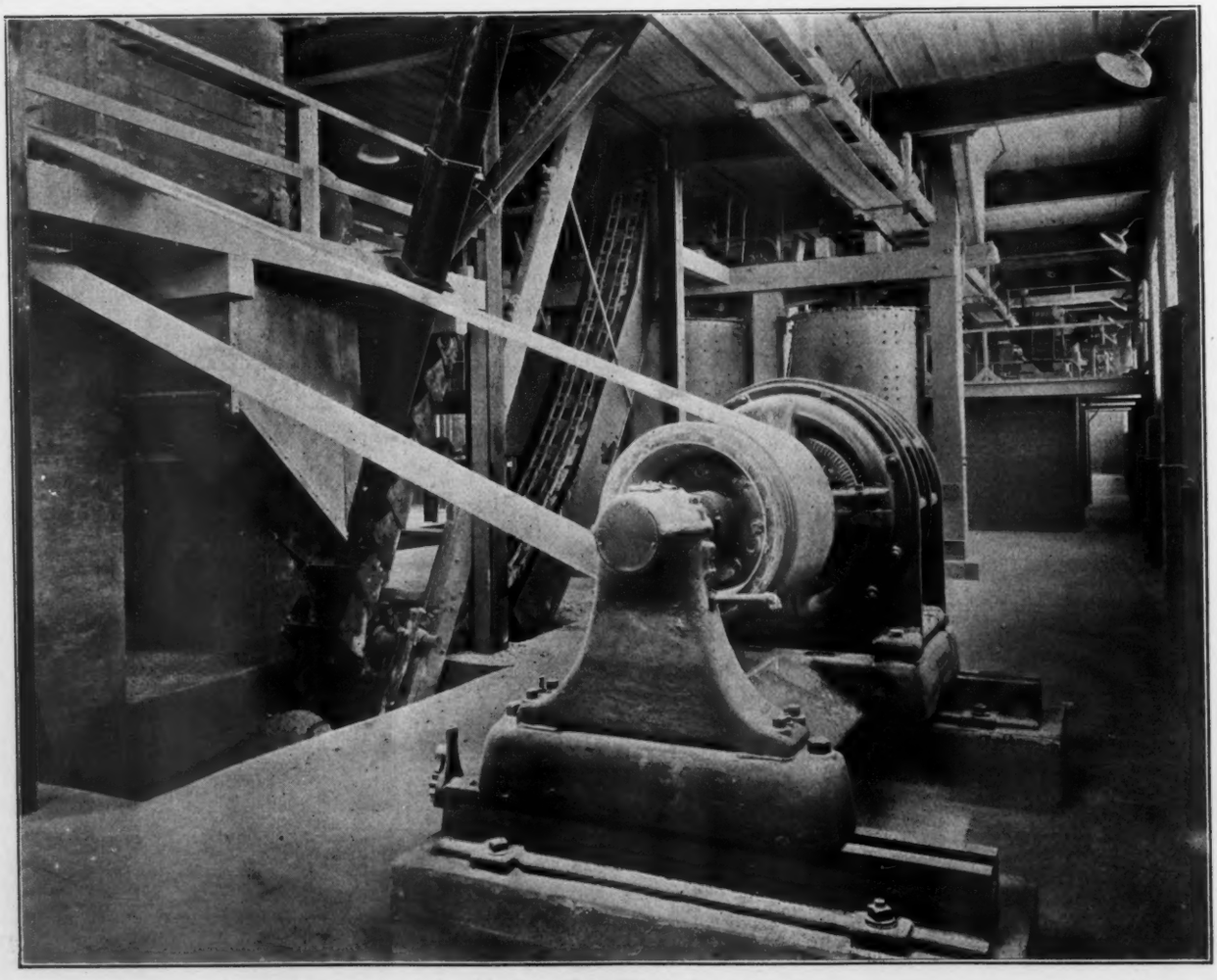
Car Load of "Crude" Asbestos

floor. Thus, if an attendant sees any foreign substance, such as a bolt, going through a screen, on its way to a crusher, for instance, he can stop the motor immediately. The motor, however, can only be started from the control room. Each motor in the mill has a start and stop push button at this point. These buttons are arranged in two groups, corresponding to the separate units already described, and each group has a master control button. In this way all the motors in one of these units may be started or stopped simultaneously by pressing one button. This centralized control is not only to guard against accidents but also against deterioration of the quality of the output. In addi-



View of Fans, Motors and Suction Pipes

View of the Dump Piles with Town of Thetford Mines in Background



View of Primary Crushing Machinery

tion to this, there is an enunciator for each machine whereby the attendant can signal to the control room his readiness to start.

There is also an ammeter for each motor which makes it possible to tell, by noting variations in the power it is consuming, whether the motor is operating properly. In this way hot bearings or other mechanical or electrical troubles are at once made apparent. In fact, it is often possible to detect these troubles in their incipiency and to correct them by simple means, when otherwise a shutdown might become necessary. A recording watt-hour meter for each department makes possible an intelligent analysis of the power actually consumed. The motors and control equipment were supplied by the Canadian General Electric Company and the installation was made by the Canadian Comstock Co., Ltd. There are many other interesting details of installation, among which is that the shafting has SKF ball bearings throughout, the fans are directly connected to their driving motors and the discharge from all the fans goes to a building where it is filtered. Tons of dust are kept out of the air by this medium.

Cleanliness

Mr. R. P. Doucet, general manager of the Asbestos Corp., and his assistant, Col. J. J. Penhale, are very insistent on the three fundamentals of modern production methods—labor saving machinery, cleanliness and safety. In visiting the various parts of the operation, and especially the mill, very few workmen are seen, and most of these are sweeping the floor. They have time to do this because the machinery is doing the work and when necessary, the method of push button control makes it easy to stop any machine. As a result of the continual sweeping, the mill is most singularly free from dust and accumulations on the floor. This is absolutely insisted upon by the management as being the only way in which dust can be kept

Air Control Levers at Top of One of the New Steel Towers

View of Mill with Conveyor in Foreground Which Runs to Bins from Which Waste is Loaded into Cars for Waste Dump

out of the finished product. Any material such as matches, nails, etc., must be kept out at all costs, especially where asbestos is used in paper making and other delicate products. This, together with the fact that the Asbestos Corp. sells on a quality basis in all parts of the world and the return of goods would mean serious financial consequences, makes it evident that almost any means of assuring uniformity is imperative.

Accident Prevention

Every possible means is taken to prevent accidents. This, of course, may mean much or nothing. However, when some of the precautions are enumerated it will be evident that it means a great deal in this plant. Naturally particular attention is paid to the pit. The first precaution taken here is to scale loose rock from all the faces. This is done several times a year and in such a way that the man who is doing the work runs no unnecessary risks. He is held from the top of the pit by a rope which is snubbed around a post so that it cannot be jerked out of the holder's hands. Moreover the work is done at a time when there is no one below who might be injured by falling stones.

Very great care is exercised in regard to blasting. This is done regularly at 10 minutes after the midday and night quitting times of the day shift and at similar times of the night shift. Everybody knows of this practice and leaves the pit at these times. Only one series of shots is fired at each of these times. If a shot fails to go off, it is held until after the next quitting time of the pit. Furthermore, only experienced men are permitted to have anything to do with blasting. The dynamite is kept in two separate, isolated concrete buildings. The thaw house is heated with hot water and the furnace is located outside the building. The man in charge is a nonsmoker, not one who is supposed to refrain from smoking while on duty, but one who never smokes at all. In addition to this bags are furnished in which to transport both the dynamite and caps and the two are never carried by the same man at the same time.

Another important precaution against accident is the weekly inspections of all cableways and sheaves. The latter are inspected and greased every noon hour. The cableways are inspected every Sunday from tower to tower by a man strapped in a special, slow moving carriage who is on the lookout for worn or broken strands or any other conditions which might lead to trouble. All machinery and belting is enclosed, although as a matter of fact, there is less belting than might be supposed because so many motors are direct connected. These precautions, together with the general cleanliness of the whole operation and the modern design of the equipment, and other measures not enumerated because of space limitations, make this plant a model in many respects.

Auxiliary Equipment

A large enterprise such as this must necessarily have its own machine shop, especially as the company makes so much of its own equipment. This shop is housed in a rather large building, part of which is partitioned off as a tin shop, where the air suction piping, collectors, etc., are made. There is also a forge shop.

Among the tools in the machine shop are a shears and punch made by the Rock River Machine Company, rolls for sheet iron work, a large Ridgeway radial drill, a hydraulic press, a large GMC lathe and two GMC engine lathes, a Cleveland open side planer, Preston shaper, and a John H. Hall pipe threader. A Herbert Morris 5 ton traveling crane is used to convey parts in the shop. A warehouse is provided for supplies and parts of machines. Both the shops and warehouses are for the benefit of all the various operations at Thetford Mines, which are controlled by the Asbestos Corporation.

Accident Toll Is 20 Times Greater than Losses in War

Accidents during the past year totalled more than twenty times the daily casualty toll suffered by American soldiers abroad during the World War, said Charles E. Hill, vice-president in charge of the public safety program of the National Safety Council, in an address at the fifteenth annual safety congress.

Mr. Hill said, in part:

"The enormous loss of life, due to accidents, as a result of a lack of carefulness on the part of our citizens is appalling, and is evidenced by the fact that last year in the United States, there were 90,000 people killed and more than two and one-half million injured, representing a casualty toll of 240 deaths and 7,000 injuries for each day of the year. This was more than twenty times the daily casualty toll to the American soldiers during the World War. Yes, the tragedies of war take their toll in frightful numbers, but the tragedies of peace register a toll beyond the comprehension of the average citizen. The direct economic loss, alone, from accidents is estimated to be at least four billion dollars per year. If these accidents could be wiped out over night our economic adjustment from this cause alone would be sufficient to dispose of our public debt in less than five years.

"If these appalling losses are not sufficient to arouse the consciences of the citizenry of this country, they may be stirred to action when they realize that 21,000 boys and girls under 15 years of age went to their death as a result of accidents last year.

"Our casualty record, as astounding as it is, is made up of a large number of accidents occurring in a great many places.

SAFETY, A SALES PROBLEM

By J. R. Davis, Works Manager, United States Gypsum Company, Gypsum, Ohio

SINCE the beginning of the safety movement it has been generally recognized that any organization must be practically sold on the idea of safety before satisfactory progress can be made in the prevention of accidents. All have undoubtedly used this very expression in one way or another, but how many of you have actually applied good sales tactics in putting safety across in your plant? It is only logical, if men must be sold on the subject, that sales methods be used, and it is just as easy to sell safety as it is to sell some article of merchandise.

One of the greatest sales weapons in the world today is modern advertising. It is a science in itself and takes on many forms, such as outdoor advertising, magazine, and newspaper advertising, form letters, etc. All of these have their value in a good safety organization. Sign boards, bulletin boards, plant papers, and circular letters should be, and are being used to advertise safety. But are we using good advertising practice in this phase of our work? A good advertising man realizes the value of attractive sign boards and frequent changes in their makeup so that they constantly attract attention. He places them where the most people will see them and wastes little money in boards on the back roads and by-ways.

Are we applying these same principles to our safety advertising? Our bulletin boards should be made as attractive as possible, the bulletins should be regularly changed and attractively arranged to draw the men's attention. News and other bulletins may be used on the board for the purpose of drawing the men so that they will read the safety bulletins while there. Bulletin boards and sign boards should be placed where they will be seen by the most men. Don't stick them off in corners, in out-of-the-way places, and expect men to read them. At night they should be well lighted, just as the live advertising man lights his sign boards. The same principles apply to the use of house organs, circular letters, etc. More thought should be given to the actual sales value of these mediums.

I recently heard a luncheon club speaker say that modern advertising was the greatest spreader of Bolshevism in the world today. His reason is that it makes us all dissatisfied with the things we have. I do not believe in Bolshevism or desire to spread it, but if our safety advertising can make the men dissatisfied with their careless lot, we have made a big advance in getting safety across. I know that many men will say this is not a new thought. You are following all these points at the present time and still do not receive the proper reaction from your men. Remember though that advertising is only a part of selling, and don't deceive yourself that you are really selling by doing only this. Here is where the real selling comes in.

A modern sales organization consists of a sales manager, division managers, territory supervisors, and actual salesmen. These may be backed up by special sales representatives, demonstrators and service men. All of these are already found in your own organizations, properly placed and fairly well equipped to take their part in an organization to sell safety.

In our larger plants the safety supervisor, or the safety engineer, or whatever he is called, is the sales manager for safety. It is his duty to direct the advertising and the efforts of the organization in conducting your sales campaign. Naturally, he must be properly qualified to fill the position and must be properly backed up by the management, the same as any sales manager. In a smaller plant where it is not possible to have a full time safety man, the plant manager becomes sales manager for safety, the same as most small plant managers are also sales managers for their products.

If there are various departments in the plant, the heads of these departments are the division managers for safety. They are the ones who should know their own territories and under the proper guidance of the safety man, they should direct the work in their department. In the larger plant where there are additional men in the safety organization, some of these may act as division managers for certain parts of the plant, and the department head then becomes a territory supervisor in the scheme. Other men in the safety department, such as inspectors, and so on, take their place as the demonstrators and service men for safety. They demonstrate the proper and safe way that work should be done and see that the workmen derive the greatest benefit from the safety work.

The next, and probably most important part of the organization, is the actual sales force. Who are the safety salesmen in your plant? Your foremen? Much has been written and said regarding the foreman's place in accident prevention, but after all isn't he really the direct salesman of safety, and are not results produced directly proportional to his ability as a salesman? No live sales manager would put a salesman on the road to sell his product unless that man knew considerable about the product and was himself actually sold on it. It is unfortunate, but true, that most of us go about our safety work blindly, scarcely realizing the value of the foremen in this work. Many

*Presented at the Fifteenth Annual Safety Congress at Detroit, October 25-29, inclusive.

times our foremen are working directly against our best interests, because they are not sold and proper efforts have not been made by the organization to sell safety to each of them, and through them to the men in the plant.

One thing that a sales manager follows is the number of calls made by a salesman. It has been definitely determined that the volume of sales is in almost direct proportion to the number of calls made. Many companies today have adopted automobiles for the very reason that they speed up their salesmen and increase the number of calls. Since the number of calls, or contacts, determines largely the volume of sales, who, then, in your organization is better fitted to sell safety than the foreman who is in constant contact with the men?

There are many ramifications in the modern sales organization, but after all it is personal contact which is largely responsible for most of the sales that are made. Advertising places the man in a favorable state of mind to the thing that is being sold, but it is usually the personal contact which finally closes the sale. How many automobiles would be sold as a direct result of advertising if the live auto salesmen did not follow up the prospect and close the deal? There are today several instances of great success in industry based entirely on the program of national advertising and direct personal contact through a widespread sales organization. Two of them that come to my mind are Fuller Brushes and Realsilk Hosiery; and let me say here that if these companies stopped their national advertising, or withdrew their salesmen from the field, they would soon cease to exist.

Their success is dependent on the continuation of sales work; and the success of our safety work in the end is not so much dependent on how good a sales organization we build up, but on how well they continue to use their salesmanship, for few men stay sold on anything. No company is ever really a success, no matter how strong their sales organization, unless they have rendered a direct service to their customers and stood back of their products. In exactly the same way our efforts in selling safety will be of no avail unless we back it up with the proper spirit of service and prove to the men that we stand back of the safety movement without any reserve.

Population Gains Ten Million

The total population of the United States on January 1st, 1926, was 115,940,000 according to statistics given out by the National Bureau of Economic Research. This is an increase of 1,629,000 over 1925 and a gain of more than 10,000,000 over the figures of 1920. The gain of 1924 was about the same as that of 1925 which was less than that of 1923 when the increase was 1,996,000. This increase of 1923 was due to the large amount of immigration of that year.

The increase during the past year was due to excess of births adding 1,367,000. Immigration added only 262,000. Of these, 10,000 were Americans returning to the United States and 252,000 were aliens. The annual legal quota of immigration is 165,000 which does not cover immigration from American countries. The immigration figures for the past year include 170,000 from American countries. European immigration is coming largely from the British Isles and Germany, Southern European countries being restricted by the Immigration Law.

Government Selects Site for Potash Exploration

The area officially selected for the beginning of the Federal Government's effort to find domestic supplies of potash, which it is hoped may render the United States independent of foreign producers of this essential material, lies in the northwest corner of Section 4, William Teer Survey, Upton County, Texas, and centers about the Dixie Hughes number 1 oil well, it is announced by the Bureau of Mines of the Department of Commerce. This area, which has been recommended by the United States Geological Survey for potash exploration, is located in a territory now developing as an oil field, oil production being obtained at an average depth of 2,000 feet. The depth to the top of the potash-bearing salts is 435 feet. The total depth recommended for test holes is 1,300 feet. Mineralogical examination of a series of cuttings shows three horizons of excellent polyhalite. Any point within a radius of two miles from the Dixie Hughes number 1 oil well is considered by the Geological Survey as favorable for potash exploration. Alternative sites for the drilling of test holes have been designated.

Under agreement between the secretaries of the interior and commerce, the choice of the drilling sites for potash exploration, as authorized under the act of congress approved June 25, 1926, was left entirely to the interior department, the bureau of mines of the commerce department to assume charge of leasing arrangements and drilling operations after the site had been selected. Under the provisions of the enabling act, it is necessary for the bureau of mines to negotiate contracts with all owners of land, or holders of potash rights or mineral leases, within a radius of one mile of the point finally selected by the bureau for drilling. The enabling act authorizes the expenditure of $100,000 per annum during the period of five years, to be expended by mutual agreement of the secretaries of the interior and commerce for the purpose of determining the location, extent, and mode of occurrence of potash deposits in the United States and conducting necessary laboratory tests.

COX LIME AND STONE BUILDS MODERN PLANT REPLACING ONE DESTROYED BY FIRE

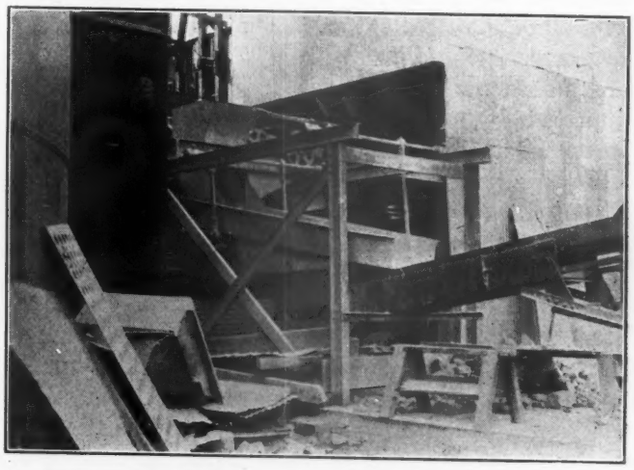
By E. D. Roberts

IT IS UNUSUAL for a family to manufacture one article, such as lime, for five generations, covering a period of 130 years thus dating back to the seventeenth century. If at the present time this plant is up-to-date and newly equipped with the latest machinery for labor saving, such a plant is usually well worth describing. The Cox Lime and Stone Company has this unique distinction. For five generations the Cox family have been directing the destinies of the company, and at the present time Mr. Charles C. Cox is president and treasurer of the company.

Starting to produce lime in the old type pot kilns in the seventeenth century, 15 miles northwest of the center of Philadelphia, Pennsylvania, this company may well be considered pioneers of lime production. At first ox teams were used to haul the lime to Philadelphia; later horses and wagons came into use. The City of Philadelphia was growing fast, and with the advent of railroads the market for this company was broadened to include New York City, eastern Pennsylvania, New Jersey and Delaware. In time masonry shaft kilns replaced the pot kilns and these in turn were replaced by four up-to-date vertical steel kilns.

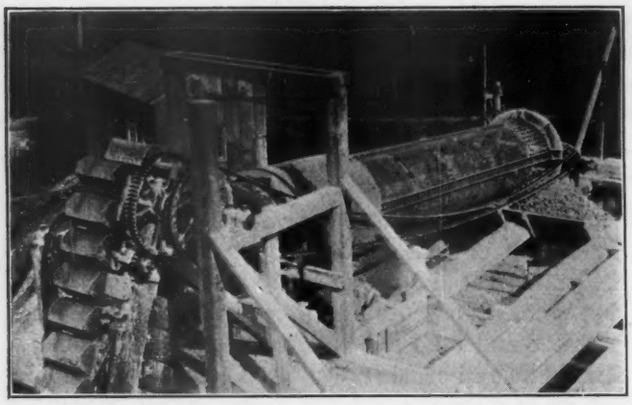
A hydrating plant was added as soon as the hydrating process was perfected. Philadelphia had grown so that the plant, which was originally 15 miles from town, was surrounded by suburban homes and the city was only five miles away. With the advent of concrete construction the location of the plant placed this company in a position to advantageously dispose of the spalls for concrete aggregates and road stone. Accordingly a number 4 Champion roll crusher was installed to crush spalls left after selecting the kiln stone, and a revolving screen was installed to segregate the different sized stone produced by the crusher.

Such would have been the situation at the plant today had not a disastrous fire on September 1, 1925, destroyed the hydrating plant and structures



Shaker Screen, Drag Conveyor from Under Storage Bin

One View of Quarry



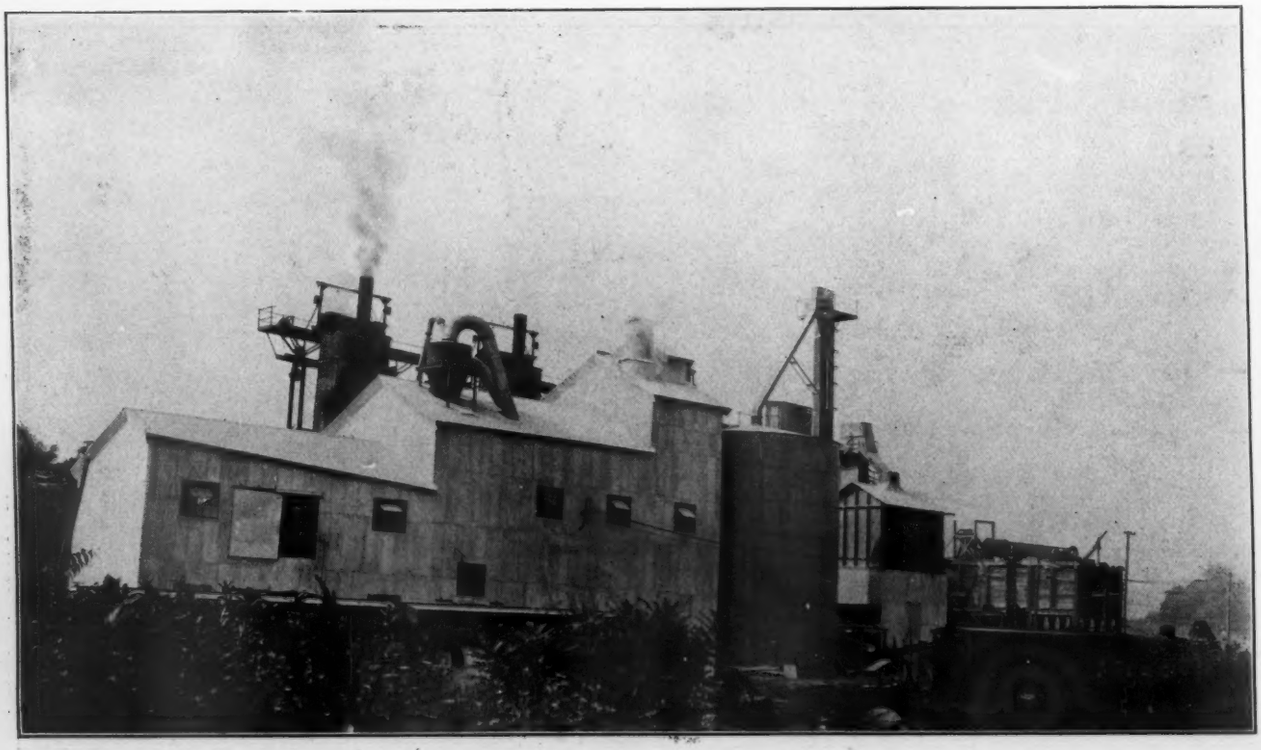
Bucket Elevator Head and Revolving Screen Over Bins

around the four steel kilns. This fire was a hard blow to the company, first because of the small amount of insurance carried and second because of the severe winter season which set in before the construction of the new plant was under way. The kilns were put in operation soon after the fire by constructing a temporary track over the kilns and a shed for protection of the men. The inclined approaches, hoisting machinery and crusher unit were not harmed. However it was not until May 1 of this year that the new hydrating unit was placed in operation. In the meantime a steel trestle was constructed to support the kiln rock cars over the kilns and a steel frame with corrugated iron covering was constructed over the kilns. Steel hoppers were placed on the bottom of the four kilns to increase the length of the cooling zones, and to discharge the burned lime on a movable conveyor. All the new structures are constructed of steel and concrete to make them as near fireproof as possible. As soon as it is convenient to do so, the approach trestle is to be replaced with a steel one and concrete and steel crushed rock bins installed in order that the whole plant will be up-to-date and fireproof.

Starting at the quarry, the various operations will be followed in order to see how the plant is constructed and operated. Two to three feet of overburden lie on top of the lime rock, but as the company is operating two levels corresponding to one face nearly 100 feet in height, very little stripping is required. This stripping is let out to grading contractors each summer who strip enough in a short time for a year's operations.

The limerock dolomite shows evidence of having gone through a great deal of upheaval leaving it in a twisted, distorted shape. Well drills have been found to be the only proper tool for putting down holes used for shooting loose the rock. These holes are placed with a Keystone well drill 18 feet from the face and 15 feet on centers. Atlas dynamite is then used for shooting loose the rock. Previously the quarry was operated with a 75 foot face which is now being followed by a lower level of 22 feet. Both faces are worked at present to provide two distinct supplies of rock, and operations are such that rock is easily accessible at one or the other face. A Gould centrifugal pump electrically operated keeps the pit free from water at all times.

The rock is hand picked and loaded into cars which are hauled by horses to the foot of the incline. First, the kiln stone is picked out and loaded; next the spalls are loaded into cars and the



General View of Plant

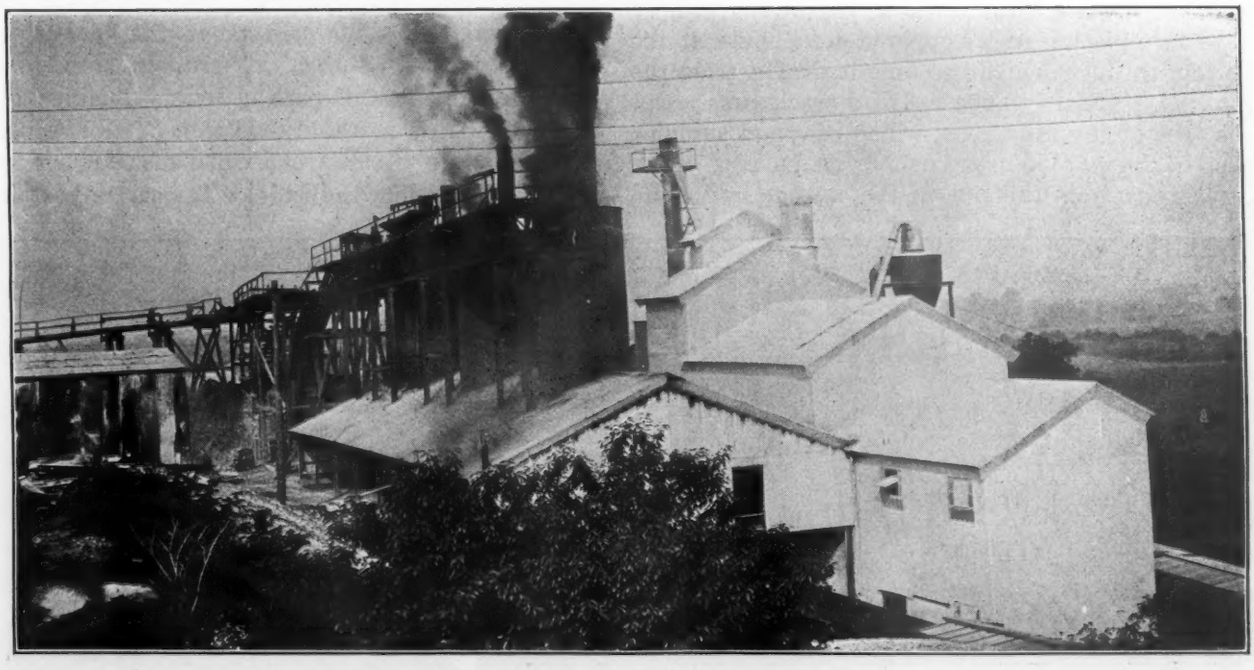
fines forked for small stone. The remaining material is loaded into cars for disposal on the dump. Arriving at the foot of the incline, there are two possible ways for the car to go, either to the kilns or to the dump. The tracks to each are parallel to the top of the incline. The same Sembrower hoist which operates the cables, pulls the cars up the two separate inclines. The operator of the hoist is placed in a little house at the head of the incline where he can see all the cars at all times. The kiln rock is hauled up and spotted opposite the kiln to be loaded and sidedumped there after which the car is allowed to run by gravity down the incline. If the rock is spalls for the crusher, it is handled up the same track as the kiln rock but to a landing just below the kiln level. Here the contents of the car are sidedumped into a chute which leads to the crusher below. If the car contains waste material, a second cable is fastened to it, and the car drawn up the inside track to the level of the tracks over the tops of the kilns. At this point the car is held a second while a switch is thrown and the car is then allowed to coast down the track which leads to the dump. This is in a worked over section of the quarry. After unloading, the car is hauled back above the switch, the switch thrown, and the car allowed to coast back down into the quarry. As there are two levels in the quarry, a system of switching has been developed so that the cars will return to the proper level as desired.

We will now follow the spalls through the crusher plant. The increased output of lime made possible by the new plant also produced a greater amount of spalls. This has to be disposed of, either by wasting or by crushing and grading for use as road stone or concrete aggregates. As there is a great demand for this material, the number 4 Champion roll crusher was replaced by a number 6 of the same make and a large revolving screen installed to screen and grade the rock. This screen, manufactured by the Beaumont Crusher Company, is at present unhoused, but it will soon be covered to provide protection from the wintry weather.

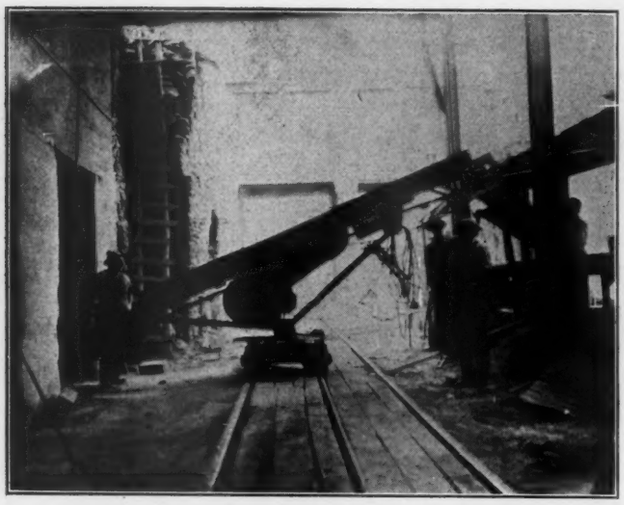
Loader Reclaiming Crushed Rock from Ground Storage

The rock, as it falls from the car, slides down a hoppered chute leading to the crusher. This, operated by a Westinghouse motor, discharges the crushed rock directly into the buckets of an elevator which conveys the rock to the top of the bin and there discharges it into the revolving screen. This screen is fitted with a sand jacket and the proper screen openings to produce the size of stone required. These several sizes fall directly into the proper bin below. Trucks are driven under the bins and loaded by slide gates.

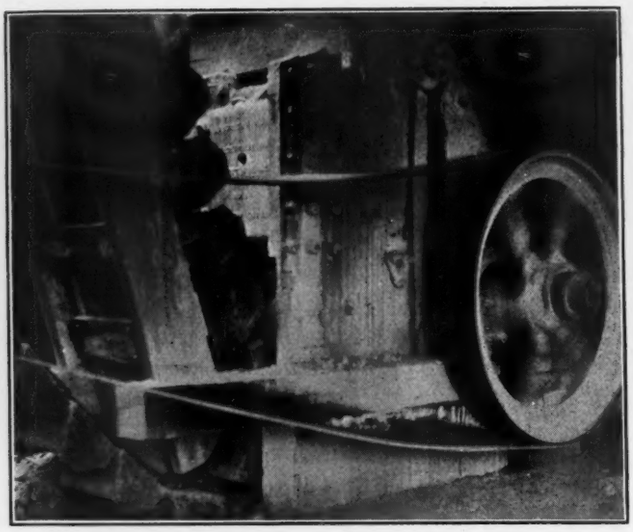
As the bin capacity is small, it frequently happens that considerable material must be stored on the ground. This rock is then reclaimed directly



End View of Plant



Portable Conveyor Fitted to Narrow Gauge Car



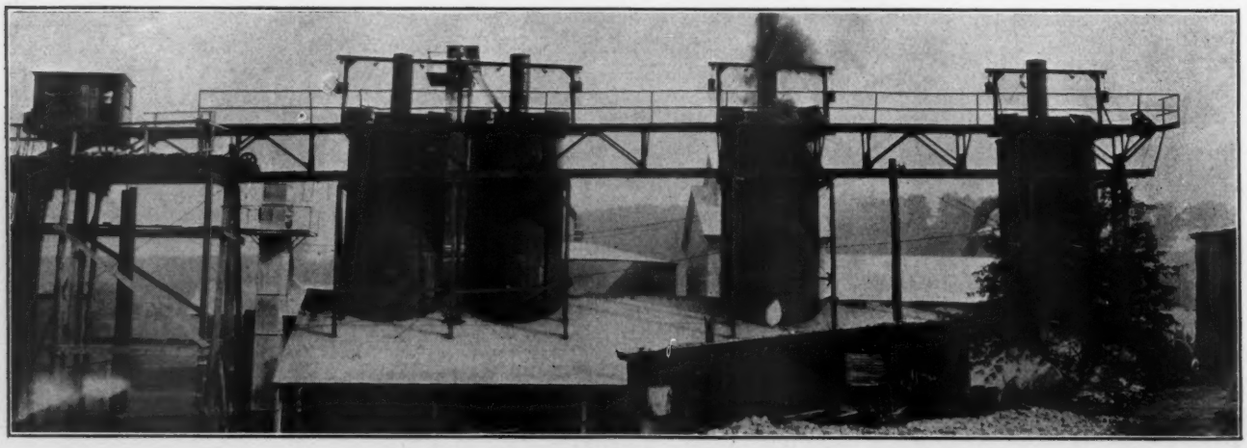
Foot of Bucket Elevator Taking Discharge Direct from Roll Crusher

into the truck by a Haiss gasoline bank loader. As the rock falls from the elevator it passes over a screen which takes out any fine particles from the rock. These fines are then chuted away from the truck by an inclined steel chute which is held directly under the inclined screen. On the outskirts of greater Philadelphia, there is a great demand for crushed stone of all grades from fines to 2 inch material. The various dealers and contractors call for the material, larger stone for concrete aggregates and road stone and the fines for road work or the manufacture of concrete blocks.

Following the manufacture of lime, there are four vertical steel kilns in line at this plant. The rock is dumped into the kilns at the top. The material is heated, burned and cooled in its passage from top to bottom of the kiln. Coal is used for fuel which is delivered to the various firing doors by carts loaded by a portable Haiss loader from storage piles.

The kilns are fitted with an extra long cooling zone terminating in a hoppered steel chute at the bottom through which the lime is drawn from the kiln. A standard gauge railroad track runs along the face of the kilns over which coal and supplies pass to the storage area beyond. A narrow gauge track runs from the side of the storage by means of a frog and third rail. A Jeffrey portable conveyor, fitted on a narrow gauge car, has been changed so that it can turn in any direction. This car operates on the narrow gauge track and is spotted in front of any kiln which has lime ready for drawing. The conveyor is then adjusted and started, the gate at the bottom of the kiln opened which allows the lime to fall on the conveyor. This carries the lime across the track and discharges it onto a Jeffrey drag conveyor. When not in use the portable conveyor is side tracked to allow the passage of cars to storage yard. The Jeffrey drag conveyor which receives the lime from the portable conveyor, carries it to the boot of a Jeffrey bucket elevator. This elevator discharges the lime into a steel bin which will hold 160 tons of lime.

When it is desired to ship lime, a shaker feeder draws it on a short drag conveyor operating under the bin. This drag conveyor discharges the lime onto a shaker screen which allows the fines to fall through into a Sturtevant crusher, but large pieces are shaken off onto a Jeffrey inclined belt conveyor with a movable head end. This head end is pushed into the box car when discharging the lime. When filling the ends of the car, a portable



View Showing Wooden Trestle and Hoist Operator's Building

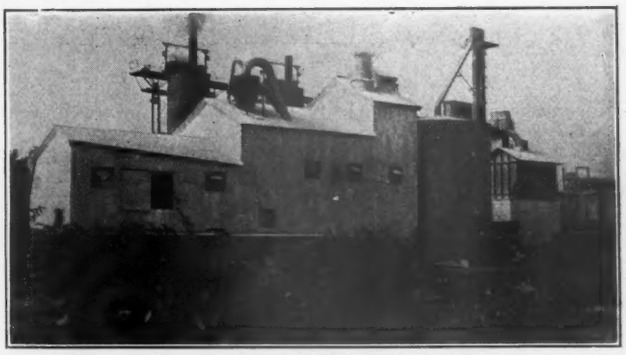
Barber-Greene elevator is placed in the car to take the discharge from the Jeffrey conveyor. Thus the car is loaded without the lime being handled by man after the rock was loaded into the car at the quarry face.

In case the lime sales do not keep pace with production, the shaker screen can be by-passed and the lime ground for "Hydrate." This contingency is well cared for by means of a sealed 1,600 ton steel bin into which the crushed lime is discharged by a bucket elevator after being conveyed from the Sturtevant crusher.

The crushed lime is drawn from the 1,600 ton bin by a screw conveyor operating underneath the bin. This screw conveyor discharges into a steel-cased bucket elevator that carries the lime up to the top of the hydrator building and discharges into a supply bin. From the supply bin it is drawn into a batcher where it is weighed by Fairbanks-Morse scales. After the proper amount is in the batcher, the contents are discharged into a Clyde hydrator. Here the crushed lime is mixed with the proper amount of water to thoroughly slack it and at the same time not have excess water to form a putty which would spoil the hydrate. When it reaches the putty stage, it is ready for application to the walls and would therefore defeat the object of hydrating. This process is to provide a material which requires mixing with water and sand to provide a plaster or mortar without having to go to the trouble of slaking and curing.

When properly hydrated, the material is drawn from the hydrator by gravity into a hopper. The next process, cooling the hydrate being a continuous process, requires that the material be fed to the cooler at an even rate. This is done by a Raymond feeder. After passing through the cooler, the hydrate falls into a short screw conveyor which carries and discharges it into a Raymond mill. This mill pulverizes the hydrated lime to the fineness of flour. A number 12 Raymond exhauster sucks the fine material from the pulverizer and discharges it into a Raymond collector which in turn discharges into a bin over the Bates valve packer. This method of withdrawing from the pulverizer insures a finely powdered material and also does away with the necessity of a screen to keep tramp iron out of the packer bin as would be the case if a screw conveyor was used to bring the material to the packer bin.

The hydrated lime is placed in paper sacks, containing 50 pounds each, by the Bates valve packer which blows the powdered lime into them. The hydrate is marketed as Cox Hydrated Lime. The Cox Lime and Stone Company markets its lime products through old established dealers that have a year round demand. A very unique and catchy trade mark is placed on each sack. It consists of a double circle in which two game cocks are fighting desperately. Over the roosters is the word COX in big letters and LIME is placed directly below the fighters in letters of the same size.



1600 Ton Storage Tank with Elevator to Discharge into Tank

Mr. Charles C. Cox, the president and treasurer of the company, maintains the principal office at his home, 425 Lyceum street, in Roxboro, a suburb of Philadelphia. Mr. Wm. Irvin Cox is secretary and Mr. W. A. Walton is manager. The plant is located at Cold Point Station on the Pennsylvania and Reading Railroad.

Government Selects Second Potash Exploration Site

The area designated as second in order of preference for exploration for commercial deposits of potash in the Federal Government's program to develop ample domestic potash supplies centers at the Mary Baker number 1 Discovery oil well in the southeast quarter of the northeast quarter of Section 8, Groome Survey, Upton County, Texas, it is announced by the Bureau of Mines of the Commerce Department. The Bureau is empowered to choose any point within a two-mile radius of this oil well for the drilling of the test hole.

This is one of the four alternative locations recommended by the United States Geological Survey as being favorably situated for potash exploration purposes. Announcement of the location of the first area in the northwest corner of Section 4, William Teer Survey, Upton County, Texas, centering about the Dixie Hughes number 1 oil well, is also mentioned in this issue.

Under the terms of the enabling Act, approved June 25, 1926, which authorizes the expenditure of $100,000 per annum during a period of five years for the purpose of potash exploration, the Bureau of Mines is required to negotiate contracts with all land owners and holders of mineral rights within a radius of one mile of the point selected for drilling. The failure of any land owner or holder of mineral rights to accept the Government's terms would, therefore, block the drilling program in that particular area.

GYPSUM HISTORY A GREAT ROMANCE

By H. J. Schweim, Chief Engineer, Gypsum Industries*

GYPSUM is one of the most ancient of building materials. The Assyrians used it in their sculpture and the Egyptians used gypsum plaster which was calcined in much the same manner as gypsum is calcined today. The Pyramids are plastered with gypsum plaster, which according to investigators, is still in good condition. The ancient Greeks were also familiar with gypsum construction because Theophrastus, who was born in 350 B. C., and also the elder Pliny (23-79 A. D.) referred to gypsum in their writings.

Some Early Deposits

Gypsum was discovered in New York State in 1792 and in 1808 a stock company was formed to quarry and market land plaster. In 1835 gypsum was found in Virginia. In 1840 a gypsum deposit was located in Grand Rapids, Michigan, and in 1850 a deposit of gypsum was discovered near Sandusky, Ohio. The deposits located in Iowa were found in 1872 and those in California in 1875. However, it was not until 1892 that the first calcined gypsum plaster was produced in New York State. In 1895 the tonnage of crude and calcined gypsum amounted to 265,000 tons which was produced in thirteen states. In 1915 eighteen states and Alaska were producing nearly ten times as much gypsum as was produced in 1895. In 1918 there was mined over two million tons of gypsum with a value of crude and calcined gypsum in excess of eleven million dollars. In 1925 over five million tons of gypsum were mined with a valuation in excess of forty-two million dollars. From these figures which are quoted from government reports you can readily realize the tremendous growth of the gypsum industry.

Sheathing A New Product

During the past few years a number of new products have been developed. One of them is gypsum sheathing board. These boards being incombustible will protect the wood studding to which they are attached from the action of fire to an appreciable degree. With the enormous annual fire loss which is growing each year, the use of any incombustible material which can be substituted for one of a combustible nature should be encouraged. With gypsum sheathing board to protect the studs from fire from the outside and with gypsum lath or gypsum wall board to protect it from the inside, these materials will go far toward reducing our shameful annual fire loss.

Tests conducted by Columbia University, Armour Institute of Technology, Chicago, and the building departments of Detroit and Indianapolis, show that gypsum sheathing board is many times stronger than wood sheathing from the viewpoint of lateral distortion.

Gypsum Concrete

Another new product is gypsum concrete, which is composed of one and one-half parts of a special gypsum cement, one part sand and three parts of broken stone, gravel or cinders. This special cement has a compressive value of 2,000 pounds per square inch and the gypsum concrete provides a total compressive strength of from 800 to 1,300 pounds per square inch depending upon the aggregate used. Gypsum concrete is being used for exterior walls and partitions in one and two story residences so that it is now possible to build an all fireproof house at a cost not much greater than of ordinary construction. In all fireproof houses, the floor construction is either a Portland cement concrete joist system or metal lumber joists are used spaced not to exceed thirty inches on centers, on top of which is placed either ribbed lath or gypsum wall board which acts as a centering for reinforced gypsum concrete floor construction.

New Gypsum Insulator

Another development is cellular gypsum. This material is used in exterior walls between the studs and in attic ceilings between the joists as an insulating medium, and being a mineral insulator it is not subject to disintegration. At present there are four different weights of this material—12, 18, 24 and 30 pounds per cubic foot, the lighter weight materials being used between the studs or joists where they are not subjected to any loads or stresses while the heavier materials are used as floor fill between wood sleepers or as a base underneath cement finished floors, or as drainage fill and insulation on a roof. More and more houses are being insulated each year so that it is only a question of time when it is going to be next to impossible to sell an uninsulated house. Figures have been furnished which show that the extra cost of properly insulating a house with gypsum has been offset by the smaller size of boiler and lesser amount of radiation required.

Great Fire Resistant

With regard to fireproofing there are eight essentials which a material should possess in order to be classed as a fireproof building material. Gypsum possesses all eight of the essentials. These, I have divided into two groups; the first four are termed absolute essentials and the second four economic essentials.

The absolute essentials are: (1) It must not burn; (2) it must not transmit heat at high tem-

*From an address delivered before Ohio Building Supply Dealers.

peratures; (3) it must not expand or contract unduly; (4) it must maintain the first three for the duration of the fire. The four economic essentials are: (1) It must be light in weight; (2) it must be easily cut and fitted; (3) it must provide a good base for plaster; (4) it must be readily obtainable.

Gypsum Sprinkler System

It is a well-known fact that all materials will fail in fire, that is if the temperature is high enough and the duration long enough. The method of failure, however, varies with different types of materials. The method of failure in gypsum is by calcination. Gypsum behaves in a fire unlike any other building material, because it possesses a characteristic inherent in no other material. It provides its own sprinkler system. When a fire strikes a gypsum wall, calcination begins—that is the water of crystallization chemically combined in gypsum is driven off. However, the depth of calcination is not proportional to the temperature or duration of the fire but calcination proceeds more and more slowly as the time goes on. As the water evaporates it leaves the calcined portion on the surface which adheres tenaciously to the balance of the material thus providing a barrier or retarder to the fire. Where the calcination is in progress the water is being driven off thus leaving a wet, steamy, soggy mass which acts as a blanket to the uncalcined portion of the material.

The big advantage in gypsum as a fireproofing medium is that as long as there is any water of crystallization left in the material the temperature on the unexposed side cannot exceed 212 degrees F., the boiling point of water, regardless of the temperature on the exposed side. At a test conducted in 1918 at the Underwriters' Laboratories, Inc., Chicago, on a 5 inch solid gypsum block partition plastered with gypsum plaster, the temperature on the exposed side at the end of four hours was 2,300 degrees F. The temperature on the unexposed side was but 150 degrees F. Figuring a room temperature of 70 degrees F. this would mean an increase of but 80 degrees F., or that less than 4 per cent of the temperature on the fire side was transmitted through the partition.

Practically No Expansion

The third point of the absolute essentials is that it must not expand or contract unduly. The reason for this is that any material that will expand or contract to any great extent in a fire, will disrupt itself by expanding and thus fail. Tests conducted by the Underwriters' Laboratories, Inc., as well as actual fires show that the contraction and expansion of gypsum in a fire is practically negligible. The reason for this is because it is impossible to heat the gypsum appreciably above 212 degrees, while there is any water of crystallization left.

The four economic essentials hardly need to be discussed. It is a well known fact that gypsum is lighter in weight than most any other structural building material. Due to the light weight of gypsum products, in the Statler Hotel at Cleveland the saving in dead load was in excess of 2,400 tons and in the Cleveland Athletic Club in Cleveland, the saving amounted to more than 3,700 tons. This means a saving in cross sectional area in beams, girders and columns and other supporting members including the footings. When we take into consideration the fact that a 4 inch reinforced gypsum slab weighs but 16 pounds per square foot we can readily see that the saving in dead load as compared with any other type of fireproof floor is tremendous.

Agricultural Gypsum

The use of agricultural gypsum has grown to such an extent it is impossible in an address like this to cover the subject. I do, however, want to say that in Switzerland, about 160 years ago it was observed that agricultural gypsum was valuable as a plant food material. Later, scientists discovered that plants required about as much sulphur as they did phosphorus and that in many soils sulphate sulphur was the limiting factor in crop production. It is now largely used as a land dressing for alfalfa, clover and various other legumes which enrich the land and provide the most valuable food for stock.

Farmers are also using agricultural gypsum in the barns and poultry houses to preserve the ammonia nitrogen value of the manure and to help keep the premises sanitary. Agricultural gypsum is also used to improve the physical conditions of soil and on arid lands to correct black alkali. It serves also as an excellent carrier of insecticides. Recently, it has been discovered that agricultural gypsum is valuable as a source of calcium in nutrition and as an aid in keeping animals and poultry in proper tone.

Gypsum Plaster

The more we know about the materials we are handling the better equipped we are to sell those materials, therefore I want to say a few things regarding gypsum plaster. Calcined plaster has a great affinity for water. It is always trying to revert to its original rock formation, consequently if stored on the ground or in a damp place it will draw the moisture from the soil or atmosphere as the case may be and the result will be short working plaster, that is, it will not carry the usual amount of sand and it will be difficult to apply. Short working plaster can be used satisfactorily by mixing one sack of fresh material with a sack of the short working plaster or it may be necessary to use two sacks of fresh with one of the old plaster.

Correction of Dry-Outs

In summer you are liable to have trouble with dry-outs. These are caused by hot blasts of air striking the plaster and evaporating the water before the plaster has set. A dry-out can easily be

detected by its light chalky appearance and the wall or spot where the dry-out occurs will be soft and crumbly. Dry-outs can be prevented. The first precaution is to screen all openings so as to prevent hot winds from striking the plaster. Do not close the openings with building paper. A circulation of air is needed to carry off the moisture so the openings should be screened with cloth. See that the plaster is applied to the proper thickness as a thin coat is much more liable to dry out.

If plastering on wood lath, wet down the lath the day before plastering and again an hour or so before plastering. If the plaster is applied to dry lath, the laths are apt to draw the water from the plaster and a dry-out will result. Also, wood laths are bound to swell when they get wet and if they have not been wetted previously so that they have had a chance to expand, they will expand and perhaps buckle when the plaster is applied, resulting in either cracked walls due to the buckle, or loose plaster due to the keys being sheared off. However, when using gypsum lath do not wet it before the application of the plaster as there is a natural bond between gypsum plaster and gypsum lath. Dry-outs can be corrected. All that is needed is more water. Spray the walls with clean water until the plaster stops absorbing it. Then examine the walls again in a couple of hours and if still soft spray again. It may require several applications but the plaster will set if it is kept wet.

The water is another matter of importance. Use nothing but clean water in mixing plaster. Do not use stagnant water as it may contain organic substances which would naturally cause a slow set. If the mechanic washes his tools in the mixing water, a quick set is apt to result. This is due to the fact that the small particles of set plaster act as a nucleus and cause the plaster to crystallize around it a great deal faster than would otherwise result. That is why a slow set can often be remedied by simply scraping off the set plaster from the sides of the mixing box or by screening a little set plaster into the mixing box.

Treatment of Sweat-Outs

A sweat-out is exactly the opposite of a dry-out. The plaster has set but the excess water has not been expelled. Sweat-outs are much more likely to occur in winter than in summer. This is due to the damp conditions which prevail during the winter season. A sweat-out can be easily detected because the plaster, though set, will be soft, remain damp and the wall will be dark in color. This condition should be corrected immediately because if allowed to remain damp for five or six days, the walls will never attain their full strength. To remedy such a situation open the windows so as to provide a circulation of air and introduce heat. Warm air will carry more moisture than cold air, consequently with a free circulation of air the excess water in the plaster will be carried away.

Quality of Sand Important

Another matter to consider, and perhaps the most important one, is the quality of sand used as well as the quantity. Do not permit "fine" sands to be used. Assuming, of course, that the sand will be clean and sharp, and free from loam and other deleterious substances, the most important thing to consider is its surface area. The gypsum, which is the cementitious material, is supposed to cover each grain of sand. A pound of fine sand has naturally more surface area than a pound of coarse sand. Therefore if a pound of gypsum will properly cement, let us say, 10,000 square inches of sand and make a good hard wall, how is it possible to get a good plaster job if due to fineness of sand employed, one pound of plaster is required to cement 20,000 square inches of sand. This is exactly what occurs when fine sand is used. You would not expect a paint that was supposed to cover 200 square feet to the gallon to cover 400 square feet.

Committee C-11 on Gypsum of the American Society for Testing Materials has prepared a standard specification covering gypsum plastering sands. These specifications with regard to grading require that not more than 6 per cent by weight shall be retained on a number 8 sieve, not less than 80 per cent by weight shall be retained on a number 50 sieve, and not more than 6 per cent shall pass a number 100 sieve. A sand that compares favorably with this specification will make a good plastering sand but care must be used to see that the percentage of fine material permitted in the American Society for Testing Materials specifications is not exceeded. It can readily be seen why fine sand should be excluded when consideration is given to the fact that one pound of sand through a 100 mesh sieve will have a surface area of approximately 10,000 square inches, and through a 50 mesh sieve approximately 5,000 square inches, while through an 8 mesh sieve the surface area of one pound of sand is but 675 square inches.

N. C. S. A. Executive Committee Meets in New York

The Executive Committee of the National Crushed Stone Association held its regular preconvention meeting in New York City at the Commodore Hotel on Friday, October 15. The following members of the executive committee and guests were present: O. M. Graves, H. E. Blair, J. R. Boyd, W. Scott Eames, A. T. Goldbeck, F. R. Kanengeiser, E. J. Krause, John Rice and W. L. Sporborg. The meeting was largely devoted to a discussion of the plans for the Detroit convention which are rapidly being perfected and give promise of producing the most successful convention in the history of the association.

HENRY STEERS HAS DEVELOPED THIS PLANT DURING THE PRESENT YEAR

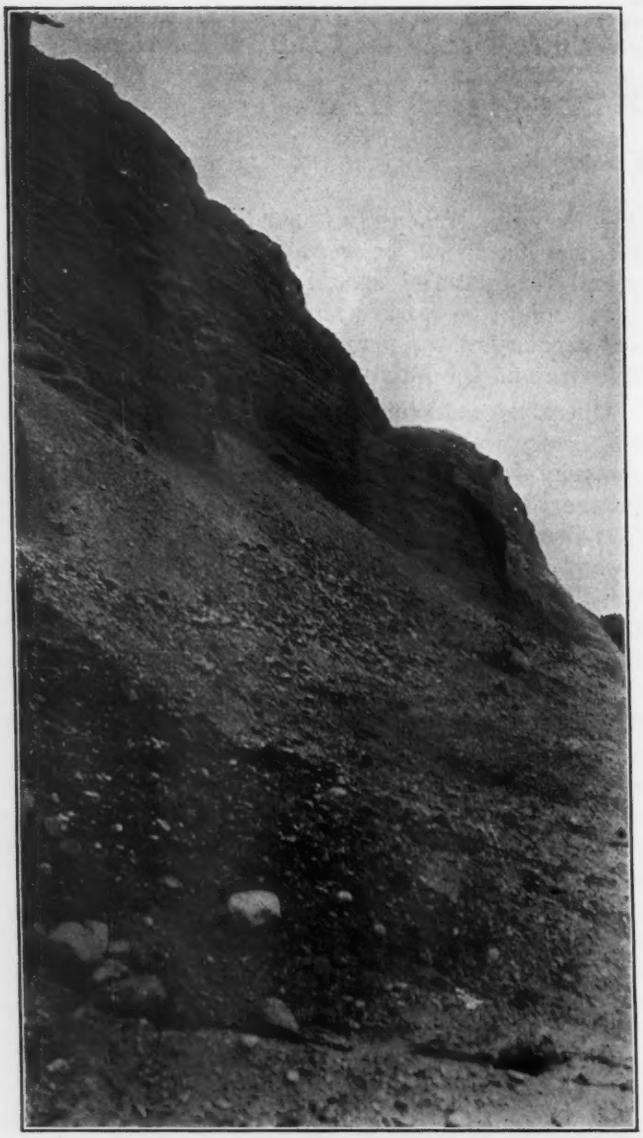
By F. A. Westbrook

THE large sand and gravel operation developed at Northport, Long Island, by the general contracting firm of Henry Steers, Inc., 17 Battery place, New York, has several unusual features. This is a large contracting company engaged in numerous important undertakings in various parts of the country and has enough jobs of considerable size to use a good deal of the material produced at its plant. Being a water front operation, shipments can be made by scow to points along the shore of Long Island Sound, Connecticut, New York City and other places. The plant is less than a year old. The company formerly had a large dredging operation on a point in Northport Harbor which was on leasehold property, but it now produces on its own land—a tract of 15 acres with a shore line of about a mile and a quarter extending back for some distance. The deposit is in a bank approximately 200 feet high and consists of a very good grade of sand and gravel with very few cobbles or boulders.

Loam occurs only on the surface or in pockets here and there, where there is a gully. This material is carefully stripped by a 20-B Bucyrus steam shovel. The principal object of this stripping is to make sure that the remaining product will be thoroughly clean and free from roots and other foreign materials. The bank is being worked on two levels—one at high water and the other about half way up. When the upper half has been taken off, the lower will be started, although if the demand for material should increase greatly, both levels might be worked simultaneously. The present capacity of the plant is 5,000 yards per day of 9 hours and the number of men employed is 50.

Operating methods have been used which appear to be very well suited to the local conditions. The material is taken directly from the bank to the crushers by means of a three section belt conveyor. The first section is 700 feet between centers, the second at right angles to the first is 400 feet and the third, which may or may not be in line with the second, is 600 feet long. The belts are 36 inches wide and are arranged on moveable structures. A turn table is provided at the discharge end of the first section on which the driving motors and gears are supported, as well as transfer chute through which the belt discharges to the crusher. About five different makes of belts and idler pulleys are on trial on the conveying system to determine which will give the best service at this plant. The pit conveyor is loaded by a Marion caterpillar shovel equipped with a 5 yard bucket. Loading is accomplished by dropping the material into a hopper stradling the conveyor, and placed on tracks it may be moved along the conveyor as the shovel is moved. The fact that the movable part of the conveyor is in three sections, facilitates moving,

Portion of Bank Showing Stratification of Gravel



Close Up of Gravel Bank

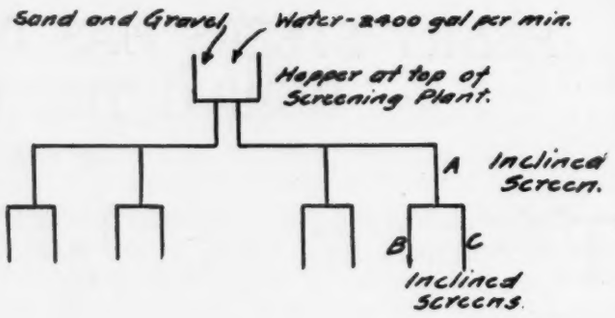
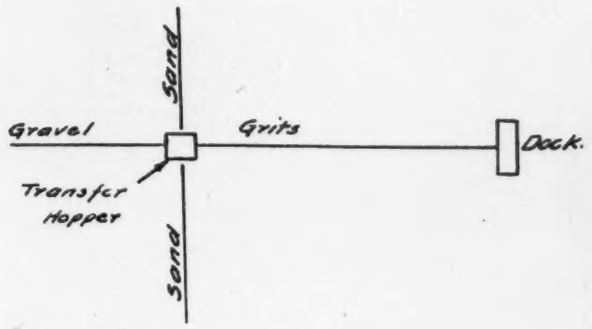


Diagram showing Arrangement of Inclined Screens for Sizing and Washing.

so as to keep within easy reach of the shovel. When the shovel is moved back only one section of the conveyor need be moved for immediate requirements and the other sections may be placed in position at leisure. The belt conveyor carries the material to a transfer hopper near the crusher. This, in turn, discharges to another 36 inch belt conveyor which carries the material into a shaking screen with punched holes. The overs from this shaking screen go to two crushers which operate in parallel. One of these machines is a 10 inch Traylor finishing crusher and the other a 12 inch type K6 Allis-Chalmers. Both are gyratory crushers. At times it is necessary to use only one of the crushers and at other periods both are operated. This diversion is necessary because the character of the excavated material varies. The crushed stone drops to a 24 inch conveyor which empties into the conveyor coming from the pit. Thus the crushed stone is scalped and no oversized pieces can get to the sizing screens.

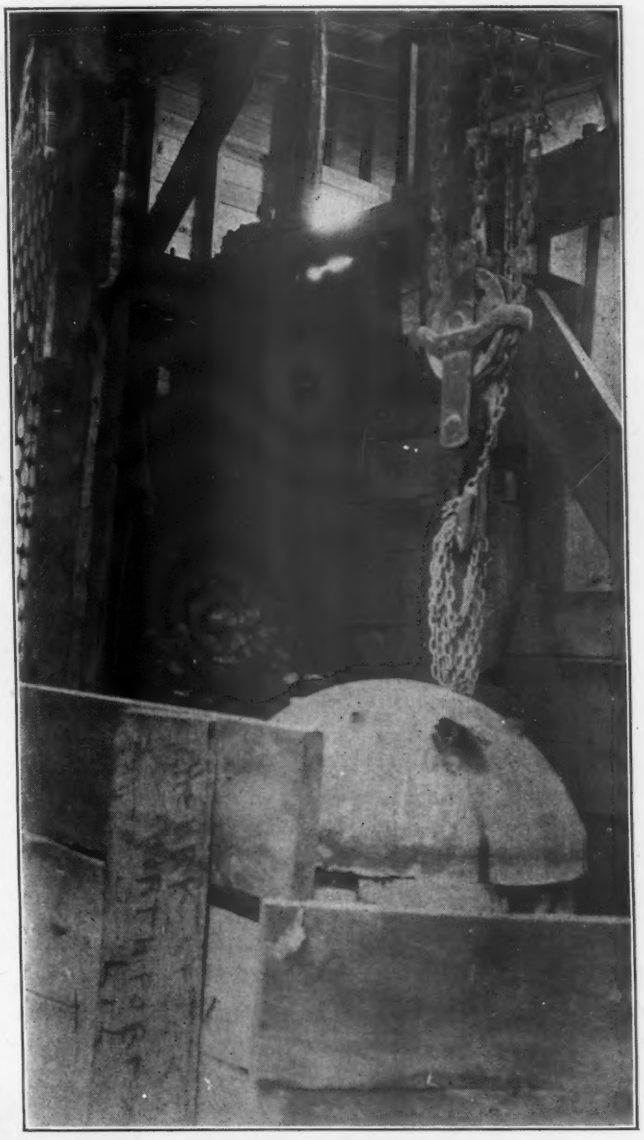
Inclined Conveyor from End of Pit Conveyor to Crushers in Building



Conveyors under Sand and Gravel Piles for Loading Barges at Dock.

Sand and gravel which passes through the shaking screen drops on a conveyor and discharges into a hopper with a stream of salt water flowing at the rate of 2,400 gallons per minute. This hopper is located at the top of the screen house. The stream of water, sand and gravel then divides into four parts, and each stream goes to a shaking screen which in turn has associated with it two more shaking screens. There are thus four units of three screens, each arranged as shown in the diagram. A, B and C are on such units. Screen A is placed at an angle of about 30 degrees with the horizontal and has an upper and lower screen. The upper section retains the 1½ inch gravel and the lower part the ¾ inch gravel.

The sand and water which passes through A divides and goes to B and C which are placed below A and at the same angle. They are also each provided with upper and lower screens of wire cloth of different sizes. The upper screen retains the coarse grits and the lower screen fine grits. The



At Top—One of the Primary Crushers, Showing Hand Hoist. Below—Housing for Conveyors Which Drop Material on Storage Piles

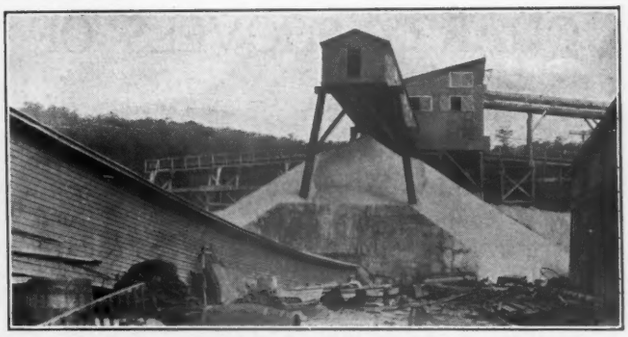
Large Shovel for Loading Pit Conveyor

sand is thus left on the last screen by the water which passes through. The screens themselves were made up on the job according to the plans of the Steers engineers. It is an interesting and important fact, that all these screens require only 28 h.p. to drive them.

The 1½ inch and ¾ inch gravels pass from the top of their respective screens to two 20 inch belt conveyors, one for each size, and carried to their proper bins placed on one side of the screen house. The two sizes of grits follow a similar procedure and are deposited in separate bins on the other side of the screen house. The sand and water pass along troughs to a series of ten large settling tanks. These are arranged in a line at right angles to the gravel and grit bins. Two are located under the screen house and are used constantly and four are located on each side of the house. Each group of four is used on alternate days so as to give the storage piles in the bins an opportunity to drain

The Vibrating Screens

Steam Shovel Stripping Loam from The Surface



Loading Conveyor Coming from Under Storage Piles

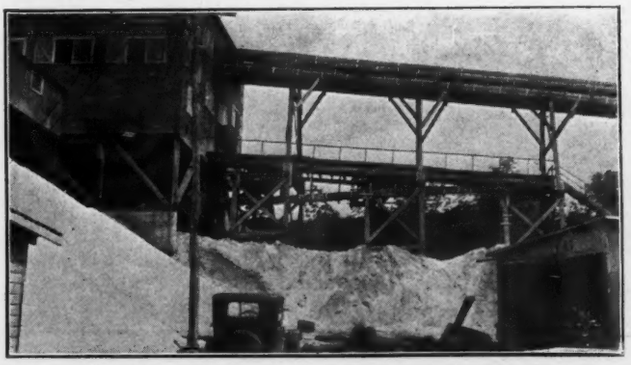
off excessive water. Disposal of the waste water from the settling tanks is receiving rather unusually careful attention. It is drawn off through a series of sluices and discharged into a settling basin. There is a market for the fine sand from the settling basin so that its reclamation for asphalt sand will materially increase the economy of the operations.

All shipping is by means of scows and these are loaded from the dock by means of conveyors. To accomplish this, tunnels with belt conveyors are provided under the storage piles. In this arrangement there is a transfer hopper at the center, with the loading belt running direct from it to the dock. The two sizes of grits are discharged from their bins direct to this belt, but the other sizes are first carried by three separate belts which discharge into the transfer hopper. It will be evident that any mixture of the different sizes is easily obtained by this layout. This is considered one of the most important and successful details in the design of the plant. The belts are 36 inches wide and all the discharge drop chutes were made by this company except the sand chutes.

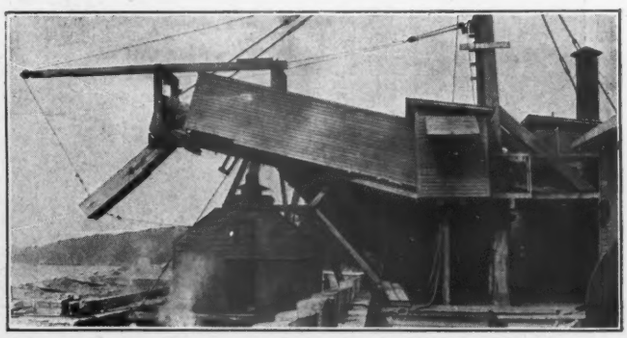
Water for washing is supplied by means of a Worthington centrifugal pump directly connected to an 1,800 r.p.m., 125 h.p. motor. This equipment is housed in a small building and is a very neat, workmanlike installation. The machinery is set on concrete foundations, somewhat below the level of the outside ground. All wires are enclosed in flexible conduits which have been carefully placed and the control apparatus is located on the walls or at the side of the building. There is also a good casement window on each side.

The plant has a machine shop which is equipped with a Niles-Bement-Pond lathe, two Bullard drill presses, a Gould and Eberhardt shaper and an Acme bolt threader. One end of the building is partitioned off as a blacksmith shop and provided with a Buffalo forge and blower. A store house has just been finished in which pipes, bolts, tools and spare parts for machinery will be stored.

A considerable amount of auxiliary equipment is used, such as a Lidgerwood hoisting engine for moving barges along the dock while they are being loaded. A small Lidgerwood is used for moving the sand and gravel chute. A Ford tractor with rigid rail attachment is used for moving the conveyors in the pit and other heavy work. A Yale and Towne triplex hand hoist has been placed over the crushers for use in repair work. From this it will be seen that the equipment of this plant is very complete and the production is on an all round efficient basis. All shipments are made by scow, very careful arrangements have been developed to avoid congestion at the dock. There are two stake boats; an inner one near the plant and an outer located near the entrance to the harbor. A tender, with an 85 h.p. gasoline motor made by the Standard Motor Construction Company is used to tow scows between the inner stake boat and the dock and do general shifting around the plant. Another small steam tugboat takes scows between the two stake boats and also makes deliveries across Long Island Sound to such places as Bridgeport and New Haven. The remainder of the shipping is handled from the New York office. The company owns four large tugs and 80 to 90 scows.



Sand Storage Piles Under the Settling Tanks



Loading Barges at the Dock

QUARRY SHOVELS OF THE PAST AND PRESENT

By G. B. Massey

FOR perhaps twenty years the only machine used for excavating and loading cars with iron ore, copper ore and rock, was the railroad, or two-truck, steam shovel mounted on railroad trucks. These steam shovels possessed the following fully recognized disadvantages.

1. The boom could only swing through less than a semi-circle so that the loading of cars required careful and frequent spotting, and it was not at all unusual to see a dipper-load being held suspended while the locomotive re-spotted the car.

2. In rock excavation, if a rock were encountered too large to load, it had to be blockholed with a jackhammer drill while the shovel waited, or else, under some conditions could be set aside close to the bank, but usually this was impossible on account of the clearance required by the jack-arms. Whichever method was adopted, it meant delay in the loading.

3. The shovel was jacked up to give it stability while the boom was swung from side to side requiring considerable time.

4. After working for a time, the materials under the jacks would often shift so that the loading would have to be stopped while the shovel was again jacked up.

5. After moving up to a new position and jacking up, a large rock often would roll down the bank and lodge so close to the shovel that the dipper could not pick it up. This meant moving the shovel back at a considerable loss of time.

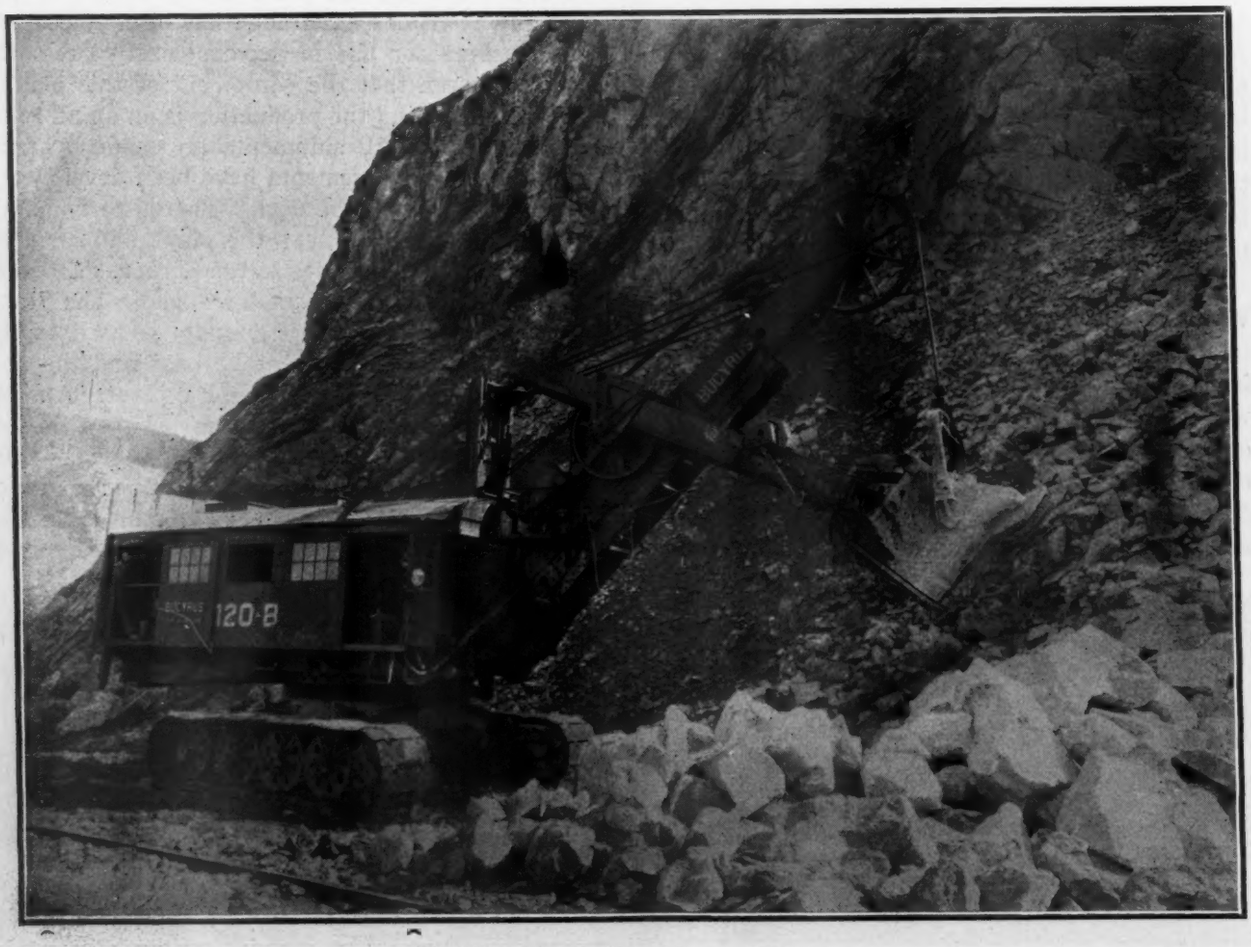
6. The railroad track sections, ties and clamps had to be handled by four to six pit-men who had to make sure that the path left by the dipper for the track was suitable.

7. When the shovel reached the end of its cut, it had to be turned around or run back, with hours of delay, by constructing a track the full length of the cut, or in case of standard gauge loading track, using that track for the purpose.

8. The crew on the shovel consisted of the runner, the cranesman and the fireman.

9. The loading was often interfered with by lack of coal, low steam pressure, waiting for water, cleaning flues, etc.

10. Under certain conditions, the runner was unable to see what was going on and was forced to depend upon the cranesman.



The 120-B Electric Shovel Excavating Rock

11. The power plant on a steam shovel was very inefficient, with a small boiler operating under an extremely variable blast in the stack, and using the steam in small cylinders with late cut-off.

Railroad Shovel Improvements

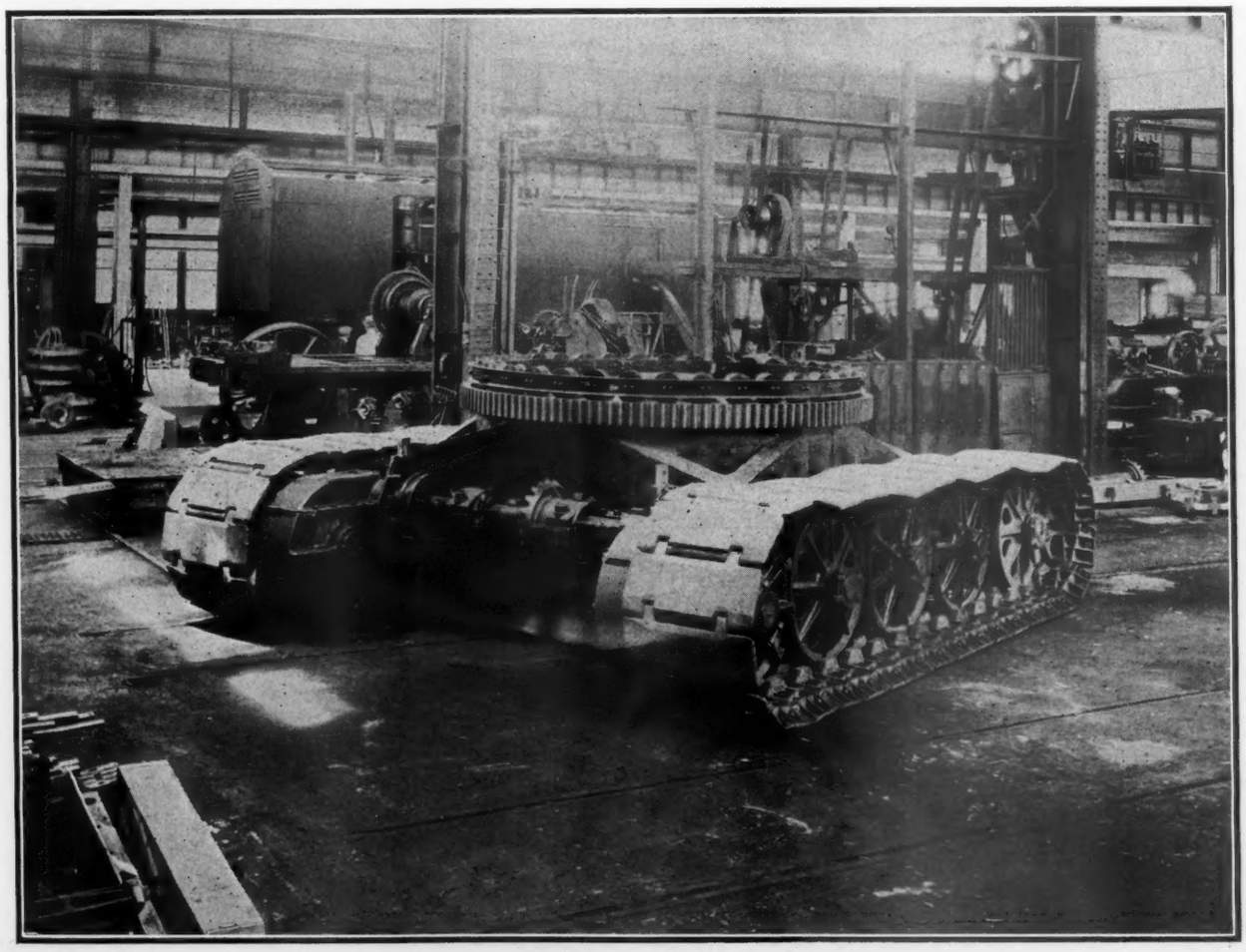
It was only natural that various attempts were made to remove the defects of the railroad shovel and make it a more ideal machine for heavy excavation and loading. The first improvement was the operation of the shovel by electricity instead of steam, thus doing away at once with the delays due to the use of steam and the necessity of a fireman on the shovel, but also taking advantage of the very high efficiency of electric motors using current developed in a large power plant.

The second improvement was the elimination of the railroad trucks and jack-arms and the substitution of caterpillar traction. This did away with most of the pit gang, gave the shovel constant and assured stability, enabled the shovel to be moved up any desired amount and to be moved back to get at some particular piece of rock. It also facilitated running back to start a new cut. At this point in the development of the railroad shovel there had been eliminated disadvantages numbers 3, 4, 5, 6, 7, 9, and 11 and a reduction in the crew listed in 8.

Quarry Type Revolving Shovel

It remained for the Bucyrus Company to eliminate disadvantages 1, 2 and 10 and still further to reduce the crew listed in 8. This they did about a year ago when they brought out their heavy revolving electric shovel known as the 120 B, the first and only full revolving shovel to be designed in this country especially for the excavation and loading of rock and heavy ores. This shovel possesses advantages which the railroad type of shovel never had. The dipper handle is spread allowing the use of a box boom with no weakening slot for a dipper handle. Hoisting chains are done away with, and the hoisting ropes pass over drum and sheave of ample diameter. This is made possible by the use of twin hoist ropes. There is no twisting effect on the hoist ropes. They pass direct in a straight line from drum to sheave. The runner always faces the work, and he has the same scope of view in any position of the shovel.

The advantages of larger digging radius, larger dumping radius, and narrower path are shown in the diagram. In this shovel every possible feature was incorporated which would increase the economy of operation and the output. It is ruggedly built in the extreme. The lower base is one steel casting while the upper or revolving frame consists of two steel castings pin connected. The weight is about the same as the corresponding size of railroad shovel and the bail pull, or pull on the bucket, is the same. The shovel will perform three average



The 120-B Revolving Shovel Caterpillar

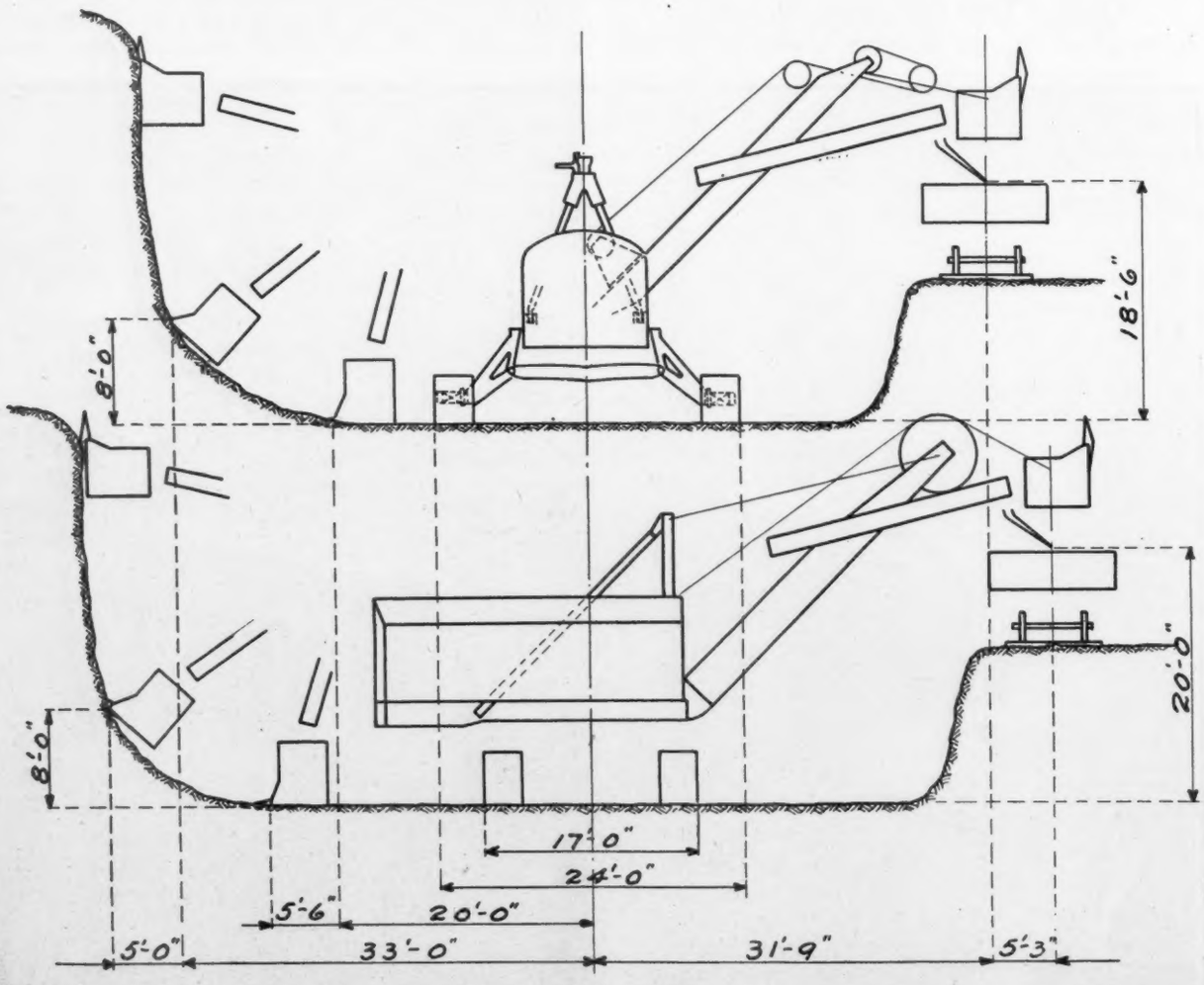
digging cycles per minute. Its accomplishments since being put into service are an indication of what the shovel is capable of doing. The monthly average rate of loading limestone in Ohio was 236 tons per hour as against steam railroad type shovels of the same size loading at the rate of 177 tons per hour. The maximum rate for a day was 265 tons per hour against 208 tons for the railroad steam shovel.

Other average daily outputs are 3,000 cubic yards of trap rock loaded in a ten hour day and 1,500 tons of limestone in 7½ hours, or 2,000 tons per day. In quarry work a large number of pieces of rock are encountered by the shovel which are too large to load into the cars or too large for the primary crusher. With the full revolving shovel these pieces are deposited behind the shovel, with the minimum interference with loading, and are blasted again out of hours after the shovel has passed on. In loading rock the power required about 0.35 K. W. H. per ton while in easier digging it drops to as low as 0.2 K. W. H. per ton. The average load is 120 K. W. with momentary peaks of 300 K. W., and the daily average ten hour load is 750 to 900 K. W. H. The shovels are in use by such well-known shovel users as the Oliver Iron Mining Company and the M. A. Hanna Company.

It does not seem as if any improvements remain to be made in the shovel, especially when electrically driven, as the operating cost for power is a minimum, the labor cost cannot well be reduced and the repair cost is very low due to extreme ruggedness.

Sandy Pratt's Company Buys Second Plant

Clarence (Sandy) Pratt, President of the Pratt Building Material Company and the Pratt Rock & Gravel Company, producers of sand, crushed rock and gravel, announces a second purchase for his companies of another plant. The latest addition is the sand and gravel plant of the American River Sand and Gravel Company, located at Mayhew, Sacramento County. This company was owned and operated by the late William S. Hatch, President of the Hatch Warehouse Company, and George S. Tyler. This new property has rail connections and controls over a half-mile of land along the American river, and a deposit of over 2,500,000 tons of gravel and sand is on the property.



The upper diagram is for a railroad type shovel. The lower diagram is for the 120B shovel. Note that all the differences between the two favor the machine illustrated by the diagram below.

DAYTON, OHIO, PRESENTS ATTRACTIVE MARKET TO MORAINE SAND COMPANY

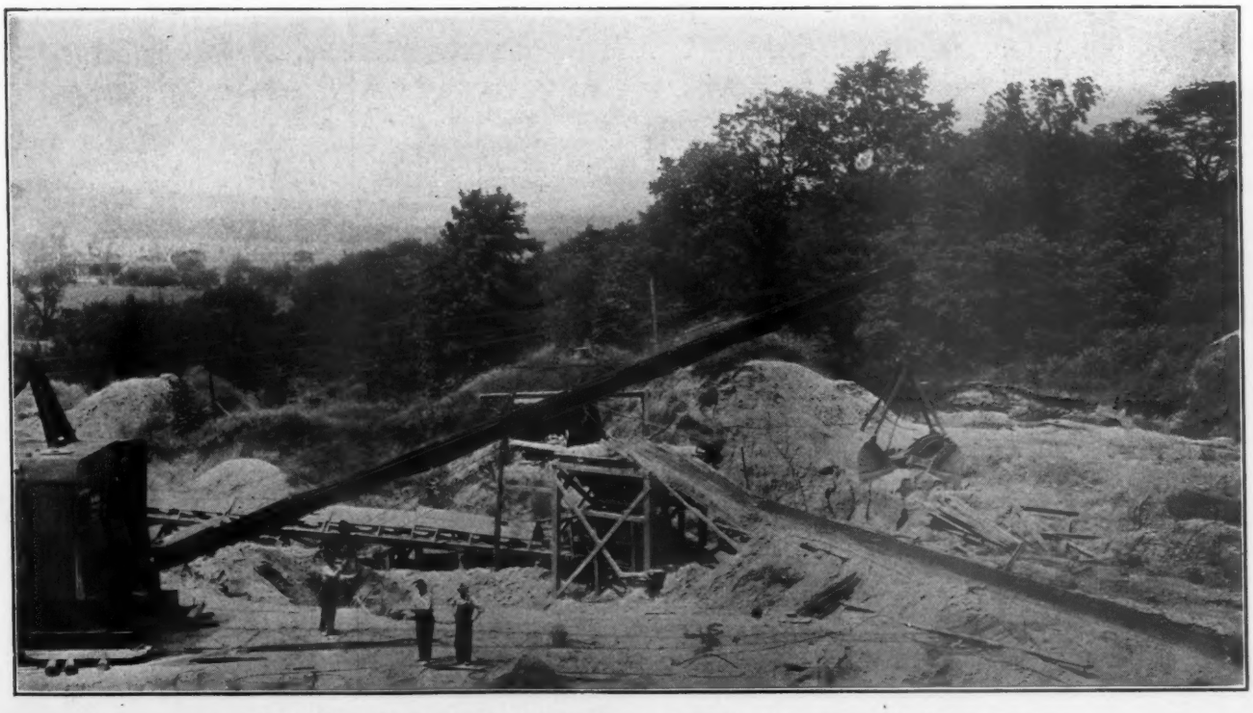
By E. D. Roberts

EXTENDING south from Dayton, Ohio, along the east bank of the Miami River there is a very unusual glacial deposit of sand and gravel which has been developed in an unusual way by the Moraine Sand Company of Dayton. Due to seasonal variation in the terminus of the prehistoric glacier, which once covered this section of the country, or its advance and recession due to other causes, alternately damming and freeing the channel through which the water from the melting ice had to pass in its journey toward the sea, a great variety of current velocities were experienced causing the deposition of varying grades of material. When the water was comparatively still due to obstructions in the channel, all the material carried by the glacier was deposited. At other times only the coarse materials were left due to the washing out of finer particles which were carried along and deposited in other pockets. These ever changing glacial conditions were responsible for the creation of the moraine deposit here mentioned.

As the glacier receded and the present drainage valleys were formed, the Miami River cut away much of the deposit, sorting out the finer particles, carrying them away, and leaving beds of gravel along its banks. This deposit forms a long hill extending to the south and at the same time provides a drainage channel for the easy passage of water that falls on the hills. This exceptionally dry condition of the sand keeps it from freezing so that this deposit can be worked the entire year.

The bank being worked by the Moraine Sand Company discloses the fact that nature was evidently trying to outdo herself in bringing together in a small tract of land, all grades of clean sand and gravel material deposited in large pockets, each grade being carefully sorted and placed. At the base of the hill is found the river washed gravel, and going into the hill extremely fine sand, masons' sand, torpedo sand, concrete sand and some gravel are found. The divisions between the various sands are so marked that it would seem as if the different grades of material had been placed there by some sand and gravel producer who had been very particular to keep the various grades separated and at the same time was crowded for storage space. This company has taken advantage of this peculiar formation to produce various grades of material using a minimum of machinery and man power and at the same time producing carefully graded material in volume with minimum expenditure.

The market served by this company is interesting and was created as follows: In 1913, Dayton was visited by a flood which took the lives of over 200 people and caused damage to property in excess of one hundred million dollars. After the flood had subsided and the people realized their loss, it was decided to employ an engineering firm to make a survey and determine means to prevent



Excavating Equipment and Plant Crew. Hopper in Center with Hoist in Rear

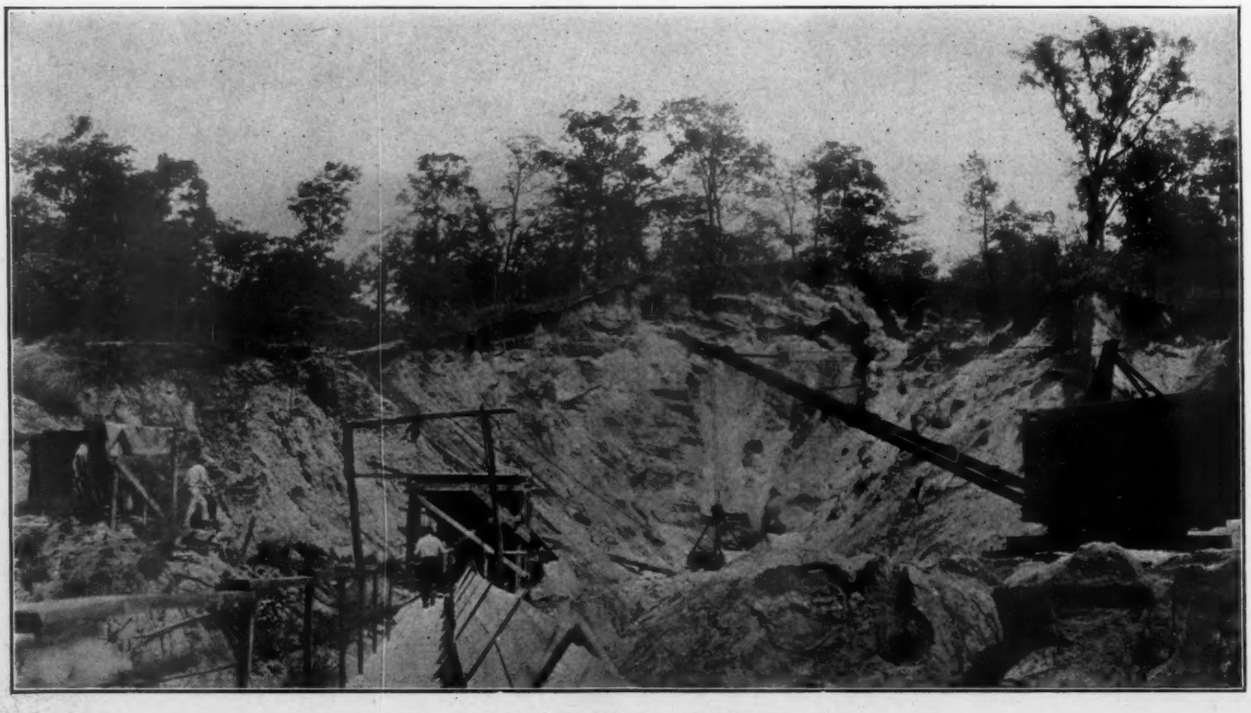
Bucket Excavating Mason's Sand

future losses from a tidal wave. These engineers made many recommendations which have been largely carried out. These called for the expenditure of about $25,000,000 in straightening channels, rebuilding bridges, providing dams for the control of flood crests and other projects which called for the use of large quantities of sand and gravel. This increased demand for sand and gravel, following closely upon the reconstruction period after the flood, caused many sand and gravel plants to be constructed until now there are over a dozen washed sand and gravel plants besides dry plants in the city limits.

During the last few years Dayton has experienced a remarkable growth, caused by many manufacturing firms that have located there. The business of these firms has grown so that additions to their plants have become necessary. This has caused many people to move to Dayton, resulting in the construction of more office buildings and homes. During the last year there has been a tremendous growth due to plant increases by subsidiary companies of the General Motors Company, Chrysler Company and others. This business influx has added over 7,000 industrial workers to the payrolls of the city. For the first five months of this year over 450 families have been entering Dayton every month.

A large yardage of black top pavement is laid in Dayton every year. This calls for large quantities of fine sand for a filler. Sand was originally brought from Lake Erie on which a high freight rate had to be paid. The discovery of a deposit of very fine sand on the Moraine Sand Company's property caused its trial as a substitute for this lake sand. It was found that the mixture of two parts moraine sand with one part of the lake sand produced a good asphalt filler and has been used since. Much of the asphalt pavement in Dayton has been laid using moraine sand as the main proportion of the filler. Inspection of this pavement shows no tendency to creep or assume the washboard effect so objectionable in this type of pavement. Thus was created a market for the extremely fine sand deposit.

About twenty years ago the Conover Brothers started the operation of a sand and gravel pit upon the site of the present Moraine Sand Company's plant. In 1924, the Conover Brothers were succeeded by the Moraine Sand Company, but they still have an interest and are represented in the list of officers. When this change was made, Mr. H. L. Bolinger was placed in charge as general



View of the Pit from Screens

manager. With the greatly increased demand for sand resulting from the increasing building activities in Dayton, it had become apparent that the capacity of the plant would have to be increased.

During this period of increasing activity, Conover Brothers and later the Moraine Sand Company was operating continuously. A Wiley Whorley was used for excavating the various sizes of sands. Each grade of sand was excavated only as ordered which, when passed over screens of their own design to take out the small percentage of gravel, produced an excellent grade of torpedo sand for concrete work, medium sand for mason's work or fine sand for asphalt filler depending upon the point from which the material had been taken.

This was a very cheap and easy way to produce the sand for market, but with the continuing increased demand for pit materials, the plant could not keep up with the sales. The plant consisted of a receiving hopper which had been placed high enough up the side of the hill so that a horizontal belt conveyor would discharge by gravity onto screens over the bins. The Wiley Whorley excavated the various materials from the bank with a 1½ yard Blaw-Knox clamshell bucket and discharged into the receiving hopper. As only one grade of material was produced at a time, and that only as called for, many moves of the excavator were necessary which required much labor and time. A Webster plate feeder fed the material from the receiving hopper on the conveyor belt which in turn discharged on the screens. These were constructed by the Globe Iron Works of Dayton according to designs of the Moraine Sand Company. The screens consisted of three 6 by 10 foot frames placed over the bins on an incline and vibrated by means of eccentrics. Over these frames there was a covering of heavy 1½ inch screen cloth to support the ¼ screen cloth used to remove the gravel from the sand. The gravel removed during the production of any of the grades of sand fell from the screen into a large bin along side of the sand bins. A Byers double drum hoist operated by a General Electric motor was used to spot the railroad cars under the bins for loading.

A study of their production problem showed that the conveying and screening equipment was capable of handling a much larger tonnage than the Whorley was able to produce, due to the many moves required by the excavator. Any other means of excavating the material, other than the selective method used, would entail the construction of a large screening plant together with large bin capacity and would therefore require the outlay of considerable money.

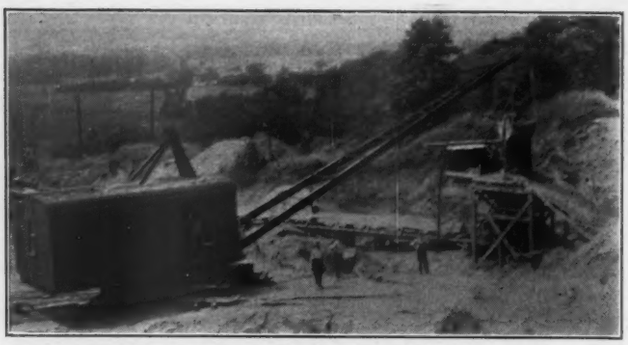
The installation of a Sauerman 1 yard drag bucket operated by a Thomas double drum hoist was finally decided upon as an experiment. Accordingly, the Sauerman bucket was installed to

Receiving Hopper with Scraper Ready to Discharge

excavate the masons and torpedo sand, allowing the Whorley to handle the asphalt sand. This it could do from one setting and as this fine sand is mostly below the level of the pit floor, the clam shell method of excavation is advantageous. This addition of a Sauerman drag bucket and Thomas electrically operated hoist has resulted in increased production at a small outlay of money and without any increase in man power. One man operates the hoist on the drag line alternating with the Wiley Whorley. Another man looks after the screens and a third man draws the material into the bins or cars for shipment.

The plant produces 100 yards per hour while working in the asphalt sand, and is a very important part of their business calling for as high as 10 cars per day. Absence of ice in the sand, due to the dryness of the deposit, enables the Moraine Sand Company to operate their pit throughout the year. In fact it is the only plant able to produce continuously in or around Dayton. This has been the means of securing much business. The cleanness of the material has made it possible for this company to compete with other

View of Bins



Excavating Asphalt Filler

local producers of washed materials on the basis of quality.

The plant is served by a spur from the Big Four Railroad for carload shipments. Local deliveries are made by trucking contractors in Shaak dump trucks. The Moraine Sand Company maintains its office at the plant located on the Springboro Pike about two miles south of the center of Dayton. Mr. C. L. Van Duzer is president and treasurer, Mr. Victor Conover is vice-president, Mr. Murray Smith, secretary, Mr. H. L. Bolinger is general manager, and Mr. Ed. S. Conover is plant superintendent. Mr. Bolinger looks after the sales, collections and other business in connection with the company.

Open Top Car Situation

The following letter was received from the American Railway Association and it is significant as it deals with the open top car situation.

"Freight car loadings, as you know, are running heavier than ever before. For 19 consecutive weeks, with the exception of two holiday periods, the total has exceeded a million cars per week, and for the week of September 18, the loading for the third time this year has exceeded all previous high records.

"The supply of surplus serviceable freight cars is practically exhausted. This condition is particularly marked in the case of open top cars, the average daily surplus of which is now only 33,039 cars, a figure less than half an average day's loading of this class of equipment. The loading of commodities usually handled in open top cars, particularly ore, sand, stone, gravel, steel products, etc., is much heavier than ever before. In spite of the extraordinary demand for open top cars the railroads up to date have generally met the situation practically without shortage, but with the prospect that the requirements will continue at the present rate, or in excess thereof, this record can only be maintained by extraordinary efforts to improve, if possible, the present good record:

First—In the movement of such cars by the railroads, and

Second—In the reduction of the time cars are held by the public.

"The attention of the railroads has been called to the importance of the first item, and the purpose of this letter is to appeal to the members of the Advisory Boards and shippers generally to assist, by giving special attention to their handling of these cars, especially for the next sixty days:

"First—By unloading cars within the free time, and within the first day of placement, if possible;

"Second—By not ordering cars in excess of immediate requirements.

"Let the slogan "NO DEMURRAGE ACCRUALS DURING OCTOBER AND NOVEMBER 1926" be adopted by every shipper and receiver in the country.

"With this program worked out successfully through joint cooperation on the part of the shippers and the railroads it can be stated as a positive fact that there will be no shortage of cars experienced during the anticipated heavy loading period of the next two months. While this letter deals primarily with the open top car situation it is also important to expedite the handling of other classes of equipment, particularly box and refrigerator cars, if continued demands are to be met successfully."

U. S. Insurance Is 189 Billion

According to the review published by Dominick and Dominick, the people and property of the United States are now insured for more than $189,000,000,000. This increase for 1925, over 9 per cent, was not confined to one class of insurance, but was registered by life, casualty, fire and marine, the three principal divisions.

"With installment buying at as high a figure as ever, with cash-and-carry purchases increasing, and sales of securities reaching every class of investor, this growth in the amount of insurance purchased is the more remarkable," the report says. "Life insurance companies during the year increased their volume of sales by about 5 per cent and insurance outstanding about 10 per cent. Casualty companies showed a sales increase of 11 per cent and a growth in policies outstanding of 20 per cent. In the fire and marine companies there was an advance of 10 per cent in total outstanding policies.

"This growth in business has been accompanied by an amazing increase in profits. For life insurance companies profits were 21 per cent greater than in 1924; for casualty companies, 41 per cent greater, and for fire and marine insurance companies the premium income was 7 per cent greater."

It is pointed out that the principal investments of life insurance companies along in 1925 amounted to about $9,500,000,000. Of this, mortgages represented $4,800,000,000 and bonds $4,331,000,000, with $81,000,000 invested in stocks.

GERMAN PORTLAND CEMENT MANUFACTURERS HEAR REPORTS OF INVESTIGATIONS

Fused Aluminous Cement

By Dr. K. Biehl

At first the procedure used to make Portland Cement was applied to aluminous, but it has been demonstrated that only through complete fusion of the raw materials can the latter be produced. For the fusion the mixture is treated in a water-jacketed kiln, preferably four-cornered to round. A second fusion method involves the use of an electric furnace, either open or closed, using mainly, carbon electrodes. Fusion in an electric furnace does not require previous treatment to eliminate carbon dioxide as is the case in the former method. The large carbon electrodes are cooled by water which runs through annular steel rings. Underneath is a removable hearth in which the fused mass is collected. With both water jacketed kiln and electric furnaces, the charge is introduced from above. The kilns are lined with pressed carbon. The effect in both fusions is a reducing one, part of the iron oxide in the water jacketed kiln is reduced to iron, in the electric furnace, a portion of the silica is reduced to silicon, and in this case a by-product of the valuable ferro-silicon is obtained. Bauxite may be used in the electric kiln and the excess of silicic acid removed by the reduction. The water jacketed kiln treats 30-50 tons raw material per day, the electric furnace (or kiln) 10-15 tons.

The fused material from the kilns is collected in an iron vessel and cooled either by air or water. The product cooled by machines exhibits different setting periods. The cooled product is then broken and ground in a combination mill. Addition of gypsum to aluminous cement is not necessary. The starting time of setting is determined by the method of cooling used. Exact knowledge of the nature of fused cement is still lacking. Aluminous cement is a hydraulic mortar manufactured from raw materials containing alumina and lime whereby a saturation of the acidic and basic constituents is accomplished. Aluminous cement contains a much higher alumina content than Portland cement (35 to 55 per cent as against 4 to 12 per cent in Portland), and a smaller quantity of lime and silicic acid. The iron oxide content is greater in aluminous cement. It also contains titanic acid.

It can now be said that the fused cement is distinguished because of its high initial strength and because of its resistance to chemical action. Another important advantage of the aluminous cement is the ease with which it can be worked at low temperature.

German and English Methods of Testing Portland Cement

By Dr. S. Haegermann

The relationship that the established values obtained by German and English methods of testing bear to each other was investigated. A comparison of chemical composition is easily made by means of analysis. The fineness of grinding is determined in England by sieves having a mesh of 895 to 5,200 per square centimeter, while the German sieves have meshes of 900 to 4,900. The volume stability is carried out by the English by Le Chatelier's method while the German test is that devised by Koch, yet the specifications meet both Koch's and Le Chatelier's requirements. A comparison of the strength values cannot be exact because these quantities fluctuate in the same method and the difficulty is increased by the existence of obsolete tests, but an approximate comparison can be made. The molded test pieces are used in different forms in the German and English standard.

The test for purity in cement according to the German standard is set aside, and that this is warranted, is demonstrated by the results of this research. Lower values are obtained by German than by English testing methods. The variations are not as great in pure cement as in a mixture of cement and mortar. These values fall within a limit of error of ± 3 degrees. The German method places more emphasis on the crushing strength which method is lacking in the English standards. The determination of the tensile strength after a curing of 28 days according to the English standard is of small value.

Effect of High Temperatures on Hardened Cement

By Dr. Kurt Endell

The effect of high temperatures upon concrete is of great technical importance because of the use of cement for structures where it is exposed to excessive heat, such as in chimneys, waste heat utilization apparatus, etc. Observations of damage by fire demonstrate the heat resisting qualities of cement. The low heat conductivity of concrete is responsible for the slight penetration. Frequently, observations made on small pieces are not paralleled in practice. The lecturer further investigated the problem of the effect of high temperatures on cement, aggregates and concrete and was concerned particularly with the decrease of mechanical strength. The question at which temperature water is evolved had not previously been considered. Besides, although the behavior of the aggregates

at high temperatures has frequently been observed many doubtful points exist. It had been determined that the crushing strength of the binding material decreases with heat, that quartz and quartz containing aggregate warp, that basalt and burned brick serve better for resistance to high temperatures and that the elimination of water from hard cement requires time. Hardened cement was heated in a platinum crucible and the heating curves plotted for Portland Cement and calcium hydrate. At 100 degrees a large amount of heat absorption occurs, for at this point the loosely combined water goes off.

A second irregularity occurs in the curve at 530 degrees, where further evolution of water occurs, and this temperature corresponds to the dissociation temperature of calcium hydrate. The investigation of the heating curve presents additional evidence that calcium hydrate exists as such in hardened cement, a fact made known by von Kaysermann and Passow. The research demonstrates that three kinds of losses of water can be observed.

1. Loosely bound water is evolved at 100 degrees.

2. Water combined as calcium hydrate goes off at 500 degrees.

3. Water containing compounds which can be dissociated only with difficulty, give up their combined water slowly and only at 1,000 degrees.

The aggregates were also examined such as quartz, granite, basalt and blast furnace slag. Quartz and granite expand up to 500 degrees, and then undergo an alteration due to the change of alpha into beta quartz, which is accompanied by cracking of the material. Basalt and blast furnace slag show a smaller expansion due to heat and one which proceeds uniformly. Quartz mixed with standard sand shows likewise the same alteration as unmixed quartz. A mixture of basalt and sand exhibits heat expansion which proceeds uniformly.

The practical results of this investigation show that for heat resisting structures such as smokestacks, waste heat apparatus, coke quenching towers, etc., quartz-containing mixtures should not be used, but aggregates composed of basalt, blast furnace slag and limestone should be employed because of their slow and uniform expansion.

Laboratory Testing of Cement

By Dr. Kühl

A method of testing strength has been developed for working with small quantities which depends upon breaking the molded test piece rather than crushing or tearing it apart. The apparatus used was a tensile strength machine built according to Frühling-Michaelis' directions. Molded slabs in the shape of small prisms, 3 cm. long and 1 square cm. cross section were used. The ends of these small slabs were firmly held by two clutches and broken by the application of a load. When the test piece is molded without pressure considerable fluctuation in results are obtained. They were formed therefore under pressure. The prisms were set on a base held rigidly on a stand, and a device which holds the clutch which breaks the test piece is operated by a side lever upon which force is applied.

The values for the breaking strength are small, due to the use of proportionately finer sand and because of the method of preparing the test pieces. It is interesting to note that the ratio of the smallest value to the largest by all three strength tests, breaking, tensile and compression is 1:3. Accordingly by the three methods of testing the difference between good and bad cement is about the same, in other words, each of the three methods can be used to form an opinion of the value of cement. The three methods of testing do not, however, run parallel. The values for the tensile and crushing strengths can be approximated from the breaking strength by multiplying, for the former by 2 and the latter by 30.

Report of the Kiln Commission

By Dr. Schott

Use of a Stehmann cooler in kilns for wet process operation results in a saving of 4.18 per cent of coal. On the other hand the cooler reduces the capacity of the kiln. It operates with a very slight excess of air, only 1.9 times the theory. The object of the cooler is to strongly preheat the air, the waste gases leaving the kiln at a temperature of 381.5 degrees when the cooler is used and at 503 degrees when it is not. The temperature of the air just previous to combustion is 643 degrees when a cooler is used, and only 104 degrees without one. The high cost of the apparatus is an objection.

Mixing of Cement

By Rudolf Grimm

It was pointed out that the carbonic acid absorbed from the air has an effect. It may readily be assumed that rapid setting is attributable to the formation of potassium carbonate from the potash of the cement. It was determined that gypsum containing cements can be made to set rapidly by the addition of potassium carbonate or slowly by addition of gypsum. The speaker concludes that the cause of the rapid setting is to be found in the action of the potash, and that potassium aluminate is probably the activating substance.

In the discussion, Professor Kühl considered it probable that potassium aluminates are the cause of rapid setting but did not believe that cement contains these substances in the free state, but rather dissolved in Alite, Belite, etc. The carbon dioxide of the air affects cement only in the presence of water.

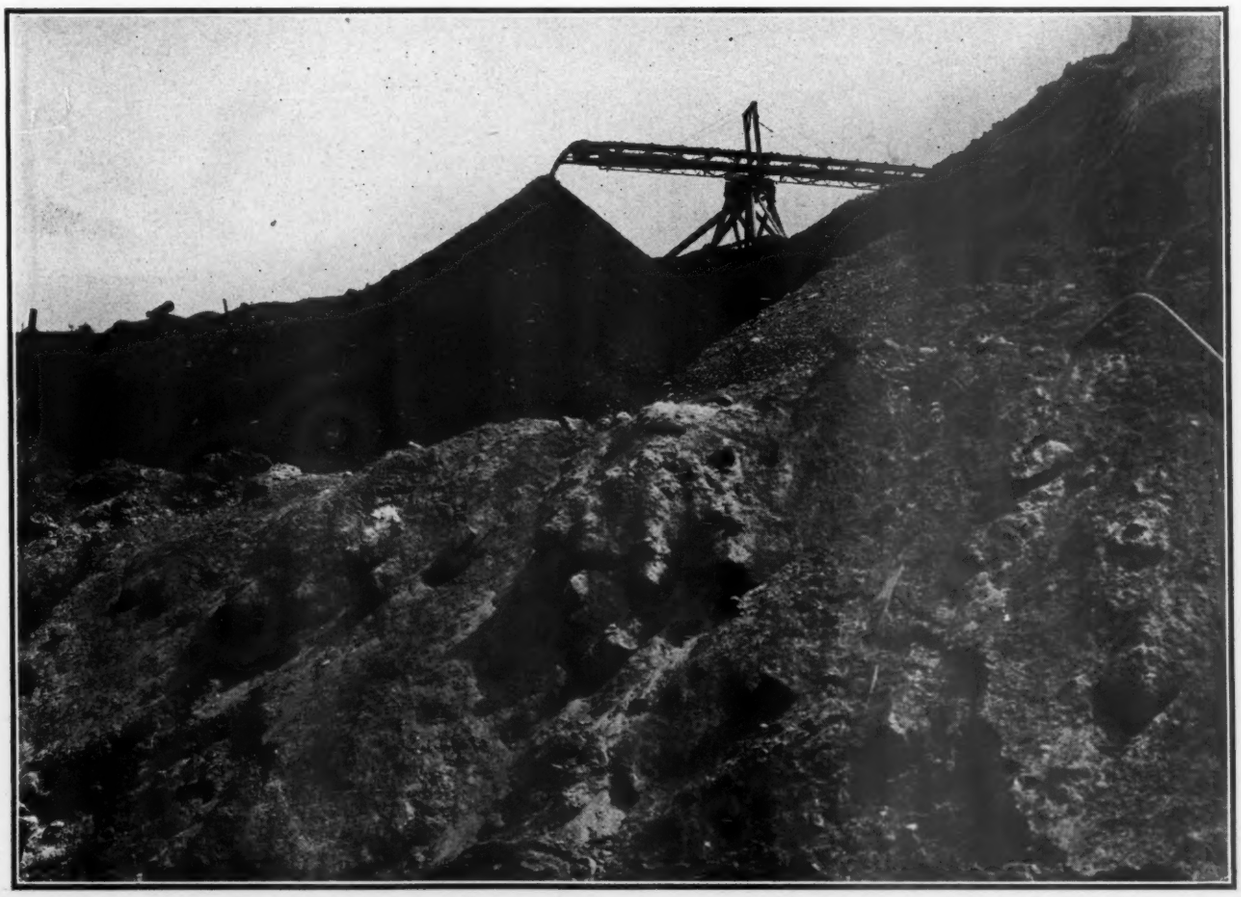
OTTAWA SILICA MOULDING SAND COMPANY REDUCES COST OF PRODUCTION

By A. C. Edwards

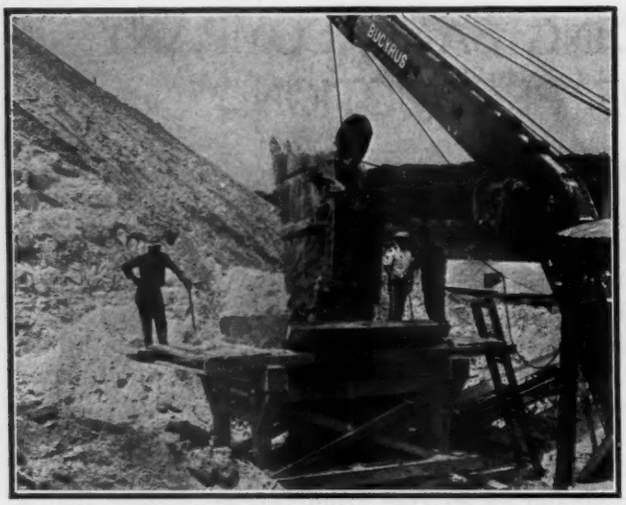
EFFECTING a phenomenal reduction in stripping costs, by changing from dump cars to Barber-Greene portable conveyors, has directed attention to the operations of the Ottawa Silica Moulding Sand Company of Ottawa, Illinois. This company started the production of silica moulding sand from the Buffalo Rock deposit in 1925. After operating two shovels loading the overburden into dump cars for a year, they decided to reduce the cost of this part of the operation by installing portable conveyors to discharge the waste material over the face of the rock into a worked over portion of the deposit. Their greatest expectations were realized for, at present, they are doing all the stripping with one shovel. In addition to the reduction in operating machinery, four men were eliminated from the stripping force. A conservative estimate has placed the saving effected in stripping at one third of the previous cost.

Buffalo Rock, of which the deposit being worked by the Ottawa Silica Moulding Sand Company is a part, was formed by a peculiar geological formation. In the far distant past, perhaps millions of years before this country was inhabitated by man, a large deposit of clean washed silica sand accumulated in the bed of a shallow lake or sea which covered the entire middle states. Some pronounced change took place in the earth's surface which caused the deposition of great masses of other material on top of the sand. The great weight placed upon the sand caused it to be compacted into its present form—that of a sandstone. This sandstone is so free from foreign matter that a jar will cause it to fall apart, and return to sand again instead of sandstone. This sandstone is called St. Peter's sandstone and underlies the middle western states at a great depth.

Many eons after the formation of this sandstone, some disturbance of the earth's crust caused a great block of this sand rock to be pushed up to the present surface of the earth. This particular block of sandstone extends westward from Ottawa, Illinois, for several miles to a place called Splitrock. At Splitrock the sandstone changes abruptly to clay and shale, showing convincingly that a faulting in the earth's original crust here took place.



Conveyor Discharging Overburden After Stripping



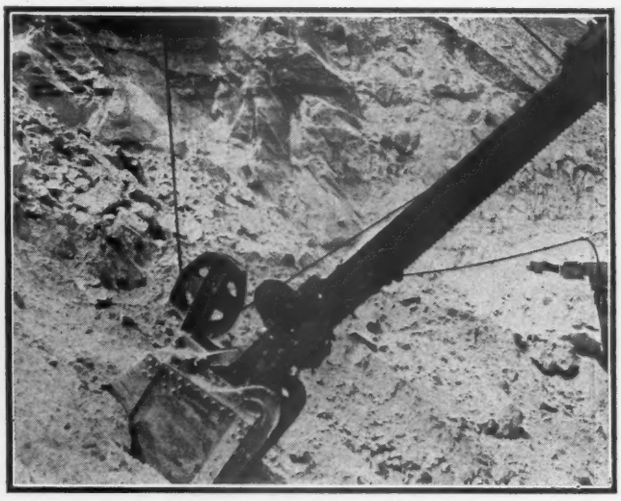
Discharging Sand to Hopper Over Belt

Shovel Stripping Overburden

In addition to its geological interest, Buffalo rock has also a historical interest due to surface changes which took place subsequent to the raising of the sandrock to its present position. In cutting its channel, the Illinois River cleaned off the sandstone for about two miles below Ottawa, cutting off about forty feet from the top of the sand rock. Due to some influence, probably a harder strata, an island was formed which, with the further cutting of its channel to the present position, has resulted in a hill called Buffalo Rock. This rock slopes from the mainland upwards towards the river where it breaks off abruptly with cliffs descending into the waters of the Illinois River. The Indians took advantage of this formation, when hunting the buffalos that used to roam the plains adjacent to the river, to secure their supply of meat. By rounding up a herd of buffalo and driving it up on this rock and then forcing them to jump over the cliff into the river, the animals were killed and meat was secured for the tribal supply.

Conveyor End of Stripping Operation

Loading Car from Belt



Shovel Entering Blasted Sand Rock

Eighty acres of this sand rock formation at Buffalo Rock has been secured by the Ottawa Silica Moulding Sand Company for the production of silica moulding sand by a direct process, consisting of excavation, conveying, screening, crushing and loading directly into the cars without any storage of materials between the mine face and the car. The sand rock extends 70 feet above the water level. The upper part of some of the rock is yellowish in color due to infiltration of water bearing a little iron stain from the clay. However, most of the rock is pure white. The deposit produces a very fine grade of silica moulding sand suitable for use in iron and steel foundries.

Stripping the overburden from the sand rock, requires several operations, due to the peculiar formation. On top of the rock is about 6 feet of hard sandy clay and above the clay is a 20 inch seam of soft coal. These two layers of material, overlaid by twenty feet of clay and soil, make up the overburden which has to be removed before the rock can be excavated. Excavation for all the stripping is done by a Pawling and Harnischfeger gasoline caterpillar shovel, first removing

Shovel End of Stripping Operation

Discharging Sand into Hopper from Shovel

the top layer of soil and clay. The coal is then drilled by Ingersoll-Rand jackhammer drills ready for placing the explosives. After shooting the coal, this is excavated by the P & H shovel and removed to a storage pile by Barber-Greene portable conveyors. Farmers who live in the vicinity purchase the coal for fuel, and the receipts lower the cost of the stripping operations. When the coal has been removed, the sandy clay is drilled and shot and then excavated with the shovel.

Stripping the three layers of material from the sand rock did not work out well with dump cars, due no doubt to the fact that the track had to be shifted and rebuilt. However, with the portable conveyors most of the moving is done by the shovel, which lifts up the receiving end of the conveyor and transfers it to the new position. The shovel then places the receiving hopper over the end of the conveyor. The conveyor is made of two sections so that either the receiving or discharge ends may be moved without disturbing the other end.

After removing the three layers of overburden,

General View of Operation, Taken from Top of Pit

the surface of the rock is thoroughly cleaned with brooms to remove small particles of foreign matter. Vertical and horizontal holes twenty feet in length, are then placed in the sand rock by Ingersoll-Rand jackhammer drills. Various explosives are used to break up the rock, Grasselli Chemical Company, Trojan and DuPont being used with equal success, which when shot causes most of the rock to break up into the sand from which it was formed.

A Bucyrus electric caterpillar shovel, equipped with a 1¼ yard bucket, excavates the sand and lumps from the face and discharges into a receiving hopper. Rails placed over the top of this hopper retain the larger lumps, which are broken by men with mauls. The sand runs through the hopper on an inclined Barber-Greene conveyor which carries the material to the top of the screening and crushing building. Here the conveyor discharges the material directly into a Galland-Henning rollerless screen, 48 inches in diameter and 16 feet long.

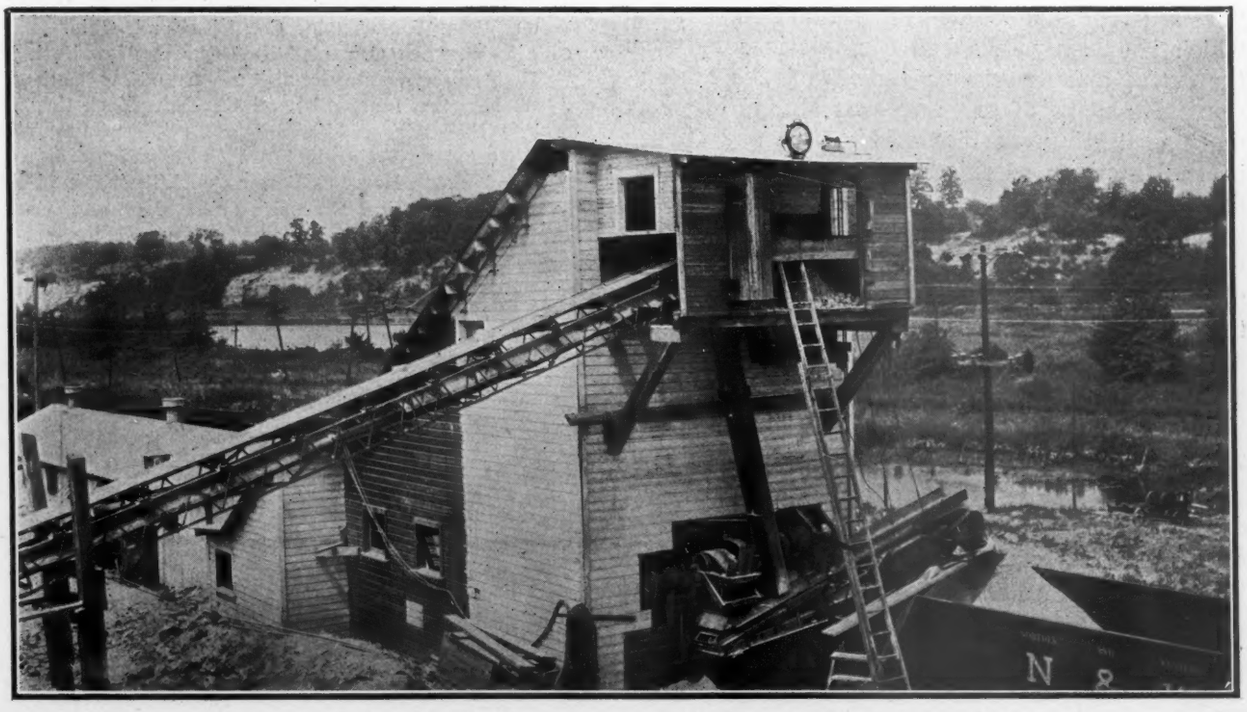
This screen is covered with a section of metal with ½ inch round holes followed by another section of woven cloth having ½ inch square holes. The material that passes through the screen is chuted on a 24 inch belt conveyor leading to a cross belt operating outside the building. This cross belt carries the sand to the car. All material that does not go through the ½ inch holes in the screen is discharged into a number 5 Williams hammer mill of the roller breaker type. This hammer mill discharges directly on a Universal vibrating screen. As the sand passes through the vibrating screen, it falls on another conveyor belt operating parallel to the belt taking the discharge from the rollerless screen and discharges onto the same cross belt which carried the sand to the car.

Cars are spotted under the loading conveyor by a Stephens-Adamson car puller which makes several spots of the same gondola car so that it may be fully loaded without hand shoveling. A 60 h.p. General Electric motor is used to operate the Williams mill and a 15 h.p. motor is used on the Galland-Henning screen. In addition to the saving already noted in the stripping operation it should be noted that there is very little lost motion in handling the sand from the face to the car which is accomplished without storage, a car being easily loaded in twelve minutes.

Mr. Ross J. Beatty is president, Mr. John J. Beatty is vice president, and Mr. Sherman M. Booth is secretary and treasurer of the company. Their office is at 1804 Borland Building, Chicago, Illinois. Mr. Omer F. Guerin is plant manager, his office being maintained at the plant.

Model Fire Resisting Building

Rapid advancement is being made in fire prevention due to a general realization of the advantages to be derived from the reduction of annual fire loss. The latest achievement in fire resistive building construction are represented in the new building of the National Board of Fire Underwriters in New York. This building is probably the most nearly indestructible from the standpoint of fire that can be found. Prospective builders will find it worth while to investigate this structure and to acquaint themselves with the details of this remarkable example of what can be done toward reducing our annual fire loss.



Belt to Scalper, Belts from Screens Discharge on Cross Belt to Car

MANUFACTURERS DIVISION OF THE N. C. S. A. HOLD ANNUAL PRE-CONVENTION MEETING

THE Manufacturers' Division of the National Crushed Stone Association held their annual pre-convention dinner meeting on Friday, October 15, at the Commodore Hotel, New York City. The meeting was undoubtedly one of the most successful and best attended ever held in the history of the organization. There were more than fifty present including guests. Among the guests were Oliver Bowles from the Non-Metallic Station of the United States Bureau of Mines, located at New Brunswick, New Jersey, W. W. Adams from the Statistical Division of the United States Bureau of Mines located at Washington, D. C., and the following officers and members of the Board of Directors of the National Association: O. M. Graves, W. Scott Eames, F. R. Kanengeiser, John Rice, E. J. Krause, A. T. Goldbeck, James Savage, F. W. Schmidt, Jr., John Rice, Jr., W. L. Sporborg, J. R. Boyd.

The meeting got under way shortly after six o'clock with a dinner. Mr. Garber presided over the meeting as chairman. Mr. Gordon Buchanan arranged the dinner arrangements much to the pleasure of all present. Immediately after the termination of the dinner, O. M. Graves, president of the National Association was called upon for a few words. President Graves sketched briefly the history of the Manufacturers' Division, pointing out its phenomenal growth from its first meeting five years ago, with about ten present, to the present meeting, with over fifty in attendance, and emphasized the spirit of helpfulness and cooperation which has always marked the relations between the active and associate members of this association. He spoke of one who was always eager to make unstinting sacrifice of his time and energy in the interests of this association and who we deeply regret is no longer with us. In silent tribute to the late F. W. Schmidt, the entire meeting stood with bowed heads for a moment. President Graves also discussed plans which were being made for the Detroit Convention and pointed out that excellent facilities were provided by the Book-Cadillac Hotel, it being possible to confine all of the activities of the convention, including the Manufacturers' Division Exhibition, to one floor.

President Graves was followed by short addresses from Mr. Goldbeck, director of the Bureau of Engineering of the National Association; Mr. Bowles and Mr. Adams of the United States Bureau of Mines; and Messrs. Rice, Krause, Eames, Savage, Sporborg and F. W. Schmidt, Jr. Chairman Garber then called upon the only representative present from Canada, Mr. R. Grubb of the Canadian Explosives, Ltd., who expressed his pleasure at being able to attend.

Mr. Greensfelder, chairman of the newly appointed committee on Welfare and Safety, was then called upon and briefly outlined the procedure to be followed by his committee. Mr. Boyd, secretary of the National Association, discussed the details of the Detroit Convention with particular reference to the Manufacturers' Division Exhibition. He stated that full particulars relative to the exhibit would shortly be mailed to all associate members and closed his remarks with an urgent appeal for all members to act promptly, as soon as they were in receipt of the application blanks for booth space. The remainder of the evening was devoted to perfecting plans for the Manufacturers' Division Exhibition at the annual convention of the association in Detroit on January 17, 18, 19 and 20, 1927, after which the meeting adjourned.

The following is a list of those present:

M. B. Garber, Sanderson-Cyclone Drill Co., Orrville, O.
Otho M. Graves, Pres., Nat'l Crushed Stone Ass'n., Easton, Penn.
W. Scott Eames, New Haven Trap Rock Co., New Haven, Conn.
Gordon Buchanan, C. G. Buchanan Co., New York City.
L. W. Shugg, General Electric Co., Schenectady, N. Y.
S. R. Russell, E. I. DuPont de Nemours Co., Wilmington, Dela.
J. B. Crew, Marion Steam Shovel Co., Marion, Ohio.
Arthur F. King, Marion Shovel Co., Marion, Ohio.
Wm. Blade, American Manganese Steel Co., Chicago Heights, Ill.
A. E. Holcomb, Koehring Co., Milwaukee, Wis.
W. O. Weil, W. S. Tayler Co., Cleveland, Ohio.
Charles W. Price, Cement, Mill & Quarry, New York City.
F. K. Armstrong, Ingersoll-Rand Co., New York City.
J. W. Moreton, Ingersoll-Rand Co., New York City.
T. E. Fisher, Allis Chalmers Mfg. Co., Milwaukee, Wis.
J. K. Brandon, Ensign-Bickford Co., Simsbury, Conn.
W. M. Annette, Hercules Power Co., Wilmington, Dela.
R. Grubb, Canadian Explosives, Ltd., Montreal, Canada.
F. R. Kanengeiser, Bessemer Limestone & Cement Co., Pittsburgh, Pa.
Oliver Bowles, U. S. Bureau of Mines, New Brunswick, N. J.
W. W. Adams, U. S. Bureau of Mines, Washington, D. C.
N. S. Greensfelder, Hercules Power Co., Wilmington, Dela.
S. E. Cole, Pit and Quarry, Chicago, Ill.
E. G. Lewis, Bucyrus Co., New York City.
G. W. Flounders, C. G. Buchanan Co., New York City.
L. D. Hudson, Symons Bros. Co., Milwaukee, Wis.
John Rice, General Crushed Stone Co., Easton, Pa.
E. J. Krause, Columbia Quarry Co., St Louis, Mo.
E. H. Paull, Ingersoll-Rand Co., New York City.
R. C. Sullivan, Rock Products, New York City.
D. C. Souder, France Stone Co., Toledo, Ohio.
Williard Young, Atlas Powder Co., Wilmington, Dela.
A. T. Goldbeck, National Crushed Stone Ass'n., Washington, D. C.
B. F. Damon, Cement, Mill and Quarry, New York City.

(Continued on page 98)

ALL WESTERN ROAD SHOW A SUCCESS

By C. W. Geiger

MORE than $3,000,000 worth of road building machinery were displayed in the four gigantic tents or demonstrated on the demonstration field at the Second All-Western Road show, held on the Marina in San Francisco, California, October 7th to 15th. The Second All-Western Road Show was intended primarily to promote the sale of equipment and machinery and to permit the showing of new products used in the pit and quarry, road building and the construction industry, to producers, road builders and engineers the newest developments and improvements in time and labor-saving machinery. In addition to this the Road Show served as the ideal medium for the "Interchange of Ideas," bringing together producers, contractors, engineers and officials from throughout the West to discuss their problems and thus to benefit from the experience of others.

One of the features that helped make the show a success was the big demonstration field, where manufacturers were given an opportunity to show their equipment in action. The popularity of the demonstration field was shown by the big increase in the number of firms who had their equipment in action during the Second All-Western Road Show.

Manufacturers of rock crushing, screening and material handling equipment were well represented both on the demonstration field and in the exhibition tents. The Iowa Manufacturing Company had a number 920 one-piece crushing and screening outfit in actual operation on the demonstration field using a McCormick-Deering tractor for driving. This equipment was operated in order to show the flow of material through the plant in order that producers, contractors, engineers and highway officials could obtain an idea of the compactness and ease of operation of the unit. The average time required in dismantling the plant and moving it a few miles and setting it up again is only one day when a crew of four men are used. Only two men are required to operate the outfit which can be driven by tractor of from 35 to 60 h. p. Many of the outfits are driven by caterpillar tractors. These outfits are built with capacities varrying from 100 to 500 yards per day. A number of improvements have been embodied in the outfit for 1927 which add to its life and reduce the operating expense to a minimum. Mr. John H. Jay, president and salesmanager of the Iowa Manufacturing Company, and Mr. W. J. Frazee, secretary and chief engineer, were in charge of the exhibits of the Iowa Manufacturing Company. This company also had a number 936 crusher on skids in operation in tent number 2.

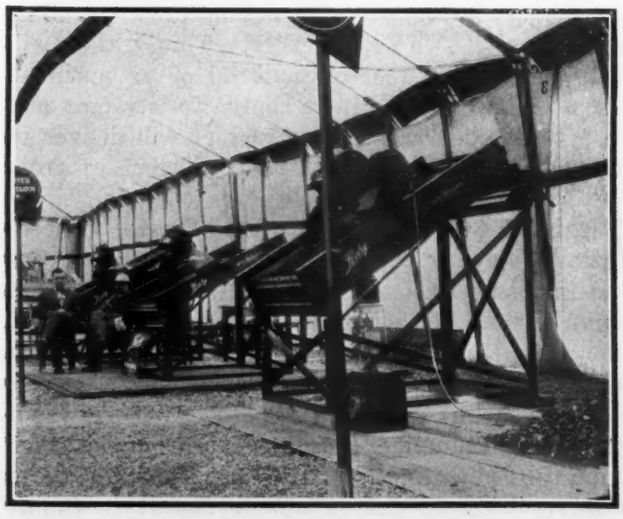
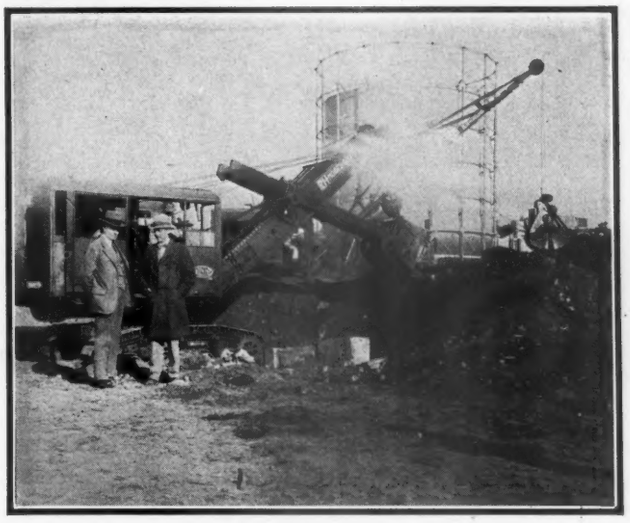


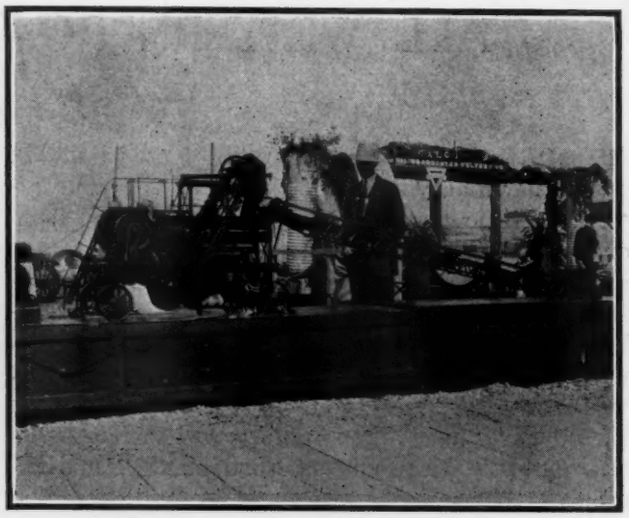
Exhibit of Deister Vibrating Screens



P. & H. Shovels in Operation

An interesting feature of the show was the exhibits of the manufacturers represented by the Edward R. Bacon Company. These exhibits were grouped so as to represent a modern paved road in the course of construction, in accordance with specifications of the California highway commission, the various pieces of equipment being seen in the actual service for which they were intended —a live, moving exhibit. At the beginning of this exhibit the Byers Bearcat skimmer was shown doing the rough grading, loading into a truck. Following the Bearcat a 60-caterpillar tractor was drawing a Baker-Maney scraper. Then came a Jaeger mixer and placing plant building a box culvert, beyond which was a Ventura scarifier drawn by a 30-caterpillar tractor, following which was an Adams leaning wheel grader drawn by a caterpillar tractor. A Johnson scarifier drawn by a 2-ton caterpillar tractor came next, doing the light scarifying. Then an Acme roller rolling the

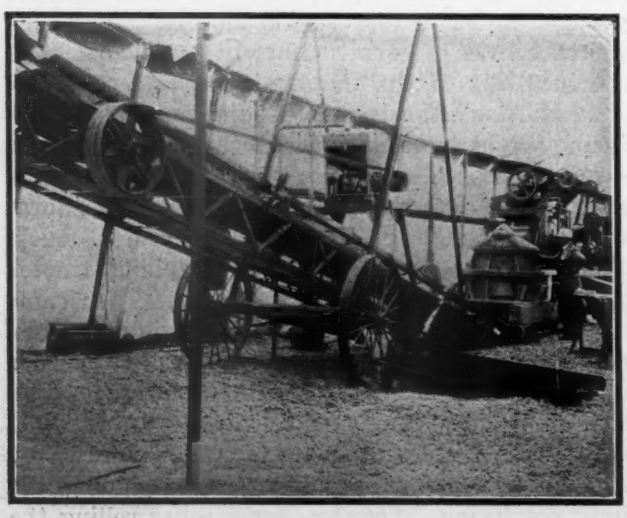
Exhibit of Easton Car and Construction Company



Russell Grader Manufacturing Company Exhibit

sub-grade and furnishing power for the Carr sub-grader which brought the sub-grade to the exact template. A Burch rock spreader and a Sterling two batch truck spread the crushed rock on a ten-foot strip and at the concrete end of the road job a number 27 E Timken-equipped Multifoote paver actually made a concrete road, as per the California Highway Commission's specifications, after which the Ord finisher finished the road. At the end was shown a 20-foot stretch of complete road.

The Easton Car & Construction Company exhibited in connection with the Edward R. Bacon Company some of their equipment among which were two cars for rock quarries. Never before have full sized quarry cars been shown at any exhibition. A large crowd was constantly around the exhibit watching Mr. W. F. Farrell, factory representative, operate the big cars by means of an Ingersoll-Rand air hoist. Each of the cars have a capacity of 5 cubic yards and are all-steel construction with oak and steel plate lined bottom. Both cars demonstrated were of the side dump type. One of the cars demonstrated was the "Phoenix Car," which has no doors to become battered or broken or hinder the discharge of any size stone the shovel dipper can hold in its teeth or the crusher take. The features of this car developed by Easton are the box section of the edges, the heavy I beam cradles supporting and strengthening the body and the unique hinges about which the body is tilted. The other car, the "Won Way," was designed only about three years ago and was so named because it can only be dumped to one side while the "Phoenix" car can be dumped to either side. The door of the WON WAY car is hinged to the bottom of the car body and is automatically swung down and outward until it is flush with the bottom of the car before the body is raised to a sufficient angle to discharge the load. Thereafter as the body is raised it remains flush with the bottom so a stone of any size rolls out of the body just as though there were no door. Many sales of both types of cars have been made to the large cement mills and quarries in the East and with this introduction to the West their adoption should be no less common. There was also exhibited the Easton standard dump and scoop cars which are popular for almost any industrial or contractor's requirement for hauling loose or flowing materials. There was also displayed one of the several types of traction drawn trailers known as the "Forty" trailer. This trailer will hold forty cubic feet of material or as much as the usual two horse drawn contractor's wagon and in actual experience by contractors will deliver to the fill or dump per day the equivalent of from two to three such outfits.



Smith Engineering Works Exhibit

In booth 303 C. A. Scott of the Diester Concentrator Company, demonstrated three Diester vibrating screens, electric motors being used to drive them. In booth 304 there was a 36-foot Northern King conveyor equipped with a 24-inch rubber covered conveyor belt, driven by a 2-cycle Le Roi gasoline engine. In booth 305 there was a number 2 reduction crusher and a jaw crusher from the Smith Engineering Works. Both of these displays were in charge of the Stuart S. Smith Company of San Francisco, distributors in Cali-

Cedar Rapids Crusher in Operation

Bodinson Manufacturing Company Exhibit

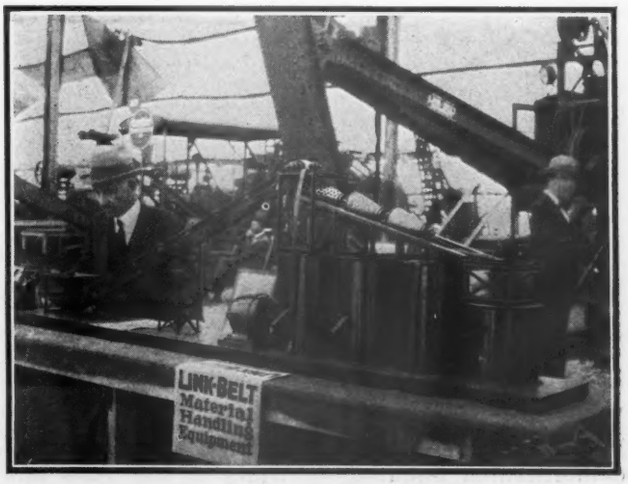
fornia for the Northern King conveyor and in San Francisco for the Smith Engineering Works and in Northern California for the Diester Concentrator Company. (The equipment in booths 304 and 305 are shown in one of the half tone illustrations.)

The Bodinson Manufacturing Company displayed a Mitchell vibrating screen and a general line of conveying and elevating machinery for gravel and crushing plants. Out on the demonstration field, they displayed a large revolving screen which had just been completed for the Hutchinson Company of Oakland. This was brought to the field on a large trailer and displayed at a point where the Clausen improved excavator, truck and batcher loader was in action, both exhibits attracting much attention. The Clausen excavator is a compact and industrious little machine that runs up on a pile, scoops it up and tosses it back into a hopper from which it is dropped into a truck or on the ground. This is the only machine of its kind ever built.

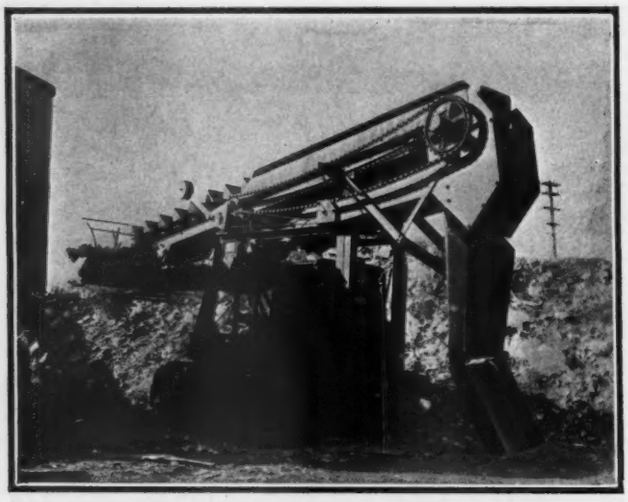
An interesting feature of the show was the operation of the various models of rock crushing, screening and material handling equipment. Perhaps the most interesting of these models was the model of a Russell No. 10 screening and crushing plant built on a one-fourth scale which can be carried in a box ten feet in length when folded up. This was driven by a small electric motor. There was also a model of a Russell portable drag line with a distance of 15 feet from the dead man to the drag line drum. These interesting working models were built at the plant of the Russell Grader Manufacturing Company. The Russell exhibit was in charge of J. T. Alm, A. J. Stanford, M. L. Elken, Jr., J. R. Arnold and J. C. North from the factory, and also the Coast Road Machinery Company, Oakland representatives.

The Link Belt Company included in their exhibit an interesting working model of a crushing, screening, washing, and storage plant. The Portland Cement Association occupied Booth No. 203 and featured concrete roads and structures by samples, photographs and moving pictures. Arthur P. Denton, district engineer in charge of the San Francisco office, had charge of the exhibit.

At the Smith-Booth-Usher Machinery Company exhibit there was in operation a small working model of a Clyde Iron Works double drum electric hoist with shieving gears and counterweight holding drum mounted on a standard type stiff leg derrick complete with derrick iron and bull wheel. This model was absolutely true in every detail of construction and an exact replica of the standard Clyde hoist and derrick, and was actually operated picking up sand and depositing it in an elevated bin. The Madsen Iron Works exhibited a miniature working model of the Madsen portable paving plant which was one-eighth actual size and actually passed the sand through the screen. Mr. Madsen also demonstrated a model of the Madsen proportioning bin. The Blaw Knox Company exhibit included a complete set up of an inundation plant, steel storage bins of various types, weighing batchers, volume batcher, steel curb and gutter forms, steel road forms, as well as a full size



A Link-Belt Plant in Operation



Link-Belt Loader and Buda Engine in Operation

turntable. A motor truck was run onto the turn table for the purpose of operating.

The largest and most extensive tractor exhibit at the show was made by the Caterpillar Tractor Company, with a complete line of caterpillar tractors many of them being continually in operation on the demonstration field drawing many types of scrapers, backfillers, subsoilers, etc. A live, moving, animated demonstration of the greatest array of caterpillar tractors ever seen in action at one time, held the attention of large numbers of intensely interested visitors on the demonstration field from opening until closing time. After ditchers and loaders had dug up certain areas of the demonstration field a caterpillar tractor operating a Killifer back filler was employed in filling up the ditches after which the ditchers and loaders again were busy with their demonstrations.

An interesting feature of the All Western Road Show this year was the various demonstrations of dump body trucks. Demonstrations were made on a very bad piece of ground with a Moreland, six wheel motor truck carrying ten ton pay load of crushed rock, and conforming with all the California State Highway laws. The equal weight distribution on the four rear wheels leaves a margin of more than a ton under the requirements of the law and the weight per lineal inch of rubber is also far under the legal limit of 700 pounds. It has been stated by various engineers of repute that a ten ton truck of this type of construction does less damage to the highway than an ordinary two ton truck with solid tires loaded to a gross weight of 16,000 pounds. According to these statements the new Moreland, six wheel dump body truck is not only a road builder, but also a road "saver." It is one thing to get a gross weight of 34,000 pounds in motion and another to stop it quickly (gross weight of the Moreland six wheeler is 34,000 pounds). The six wheel Moreland's brakes were demonstrated hundreds of times at the show and it was proven beyond a doubt that when driven up to seventeen miles per hour it could be brought to a dead stop in less than 12 feet with manual effort. The Moreland Motor Truck Company is the largest truck factory west of Chicago having a chain of 15 directly owned and controlled branches covering the entire Pacific Coast reaching from Seattle and Spokane in the north to San Diego in the south.

A heavy duty Autocar dump truck was engaged in demonstrating its ease of operation and short turning ability throughout the duration of the show by cooperating with the many power driven shovels that were in operation on the demonstration field. The shovels would bite into the earth and deposit their load into the Autocar, which would then dump the load on the other side of the power shovel.

One of the most sensational events of the show was the digging up by a Barber Green ditcher on the demonstration field of a piece of concrete sidewalk on which was imbeded the date May 2, 1871, thus making this the oldest piece of concrete in America. This piece of concrete must have been made with imported cement as it was not until about 1874 that cement was manufactured in America. The demonstration field as well as the ground on which the show was held is the historic location of the Panama Pacific Exposition (now named the Marina). There were thousands who attended the Road Show who can recall having covered these grounds during the dazzling spectacle that glittered here so brilliantly 11 years ago.

But the Marina has changed since that colorful time. One by one the various buildings that seemed then to present a solidity of construction that would stand for an eternity, have fallen before the ceaseless onslaughts of wind and rain and the erosion of time. Only the Palace of Fine Arts remains, and this stately temple of the muses is even now awaiting the final word that will bring it tumbling down, a mass of debris to be scooped up by the prosiac power shovel. Real estate promoters have exploited the major portion of the choice site that was there created, but there has remained, unoccupied for these 11 years a plot of 15 acres. Weeds and underbrush, brickbats and refuse thrive in vacant lots. They spring up and multiply with an industry that defies understanding. And after a decade of unrestricted freedom, these elements had taken complete charge of the once proud location.

It was this forbidding and desolate spectacle that first presented itself to that enthusiastic and altruistic group that had pledged themselves last year that the All-Western Road Show would indeed become a reality. And in a manner truly indicative of the indomitable spirit that has pushed our roads and highways through the once trackless wilderness, to the remotest ends of our far-flung Western empire, they set about the task of constructing, on this unlovely dumping ground of the city, a fitting location for their mammoth project.

ADIRONDACK FELDSPAR COMPANY OPERATES EXCELLENT PROPERTY IN NEW YORK

THE Adirondack Feldspar Corporation was organized, September, 1925, to acquire, take over and operate the feldspar property formerly owned by the Maco Development Company. Considerable material had been mined and shipped by the Maco Company, to manufacturers of scouring soaps and for stucco dash, concrete block facings, chicken grits, etc. The spar was practically all taken from the top layers, or strata, of the deposit, no especial effort having been made to acquire depth where, it is conceded, the purer spar is found.

The property of the corporation is situated in Saratoga County, New York, the crushing plant being in the village of Wilton, on the Hudson Valley Railway and the mines are about 2¼ miles northwest of Wilton. Wilton is located approximately 8 miles north of the city of Saratogo Springs, New York. The property comprises approximately 212 acres; the main tract on which the mines are located, contains 165 acres, the tract close by contains 45 and the mill site, on the Hudson Valley Railway, at Wilton, contains about 2 acres.

On the main tract of this property feldspar, in commercial deposits, commonly occurs together with quartz and oftentimes with mica in masses or rock called pegmatite. This occurs in shoots, lenses, masses and dikes intruding into other rocks such as granite, gneiss, schist, etc. Outcropping, or dikes, impregnated with feldspar, occur in many parts of the property, indicating an extensive mineralized area. The main body, or vein is well defined and traceable for approximately 1,800 feet, the trend of the vein being northeast and southwest.

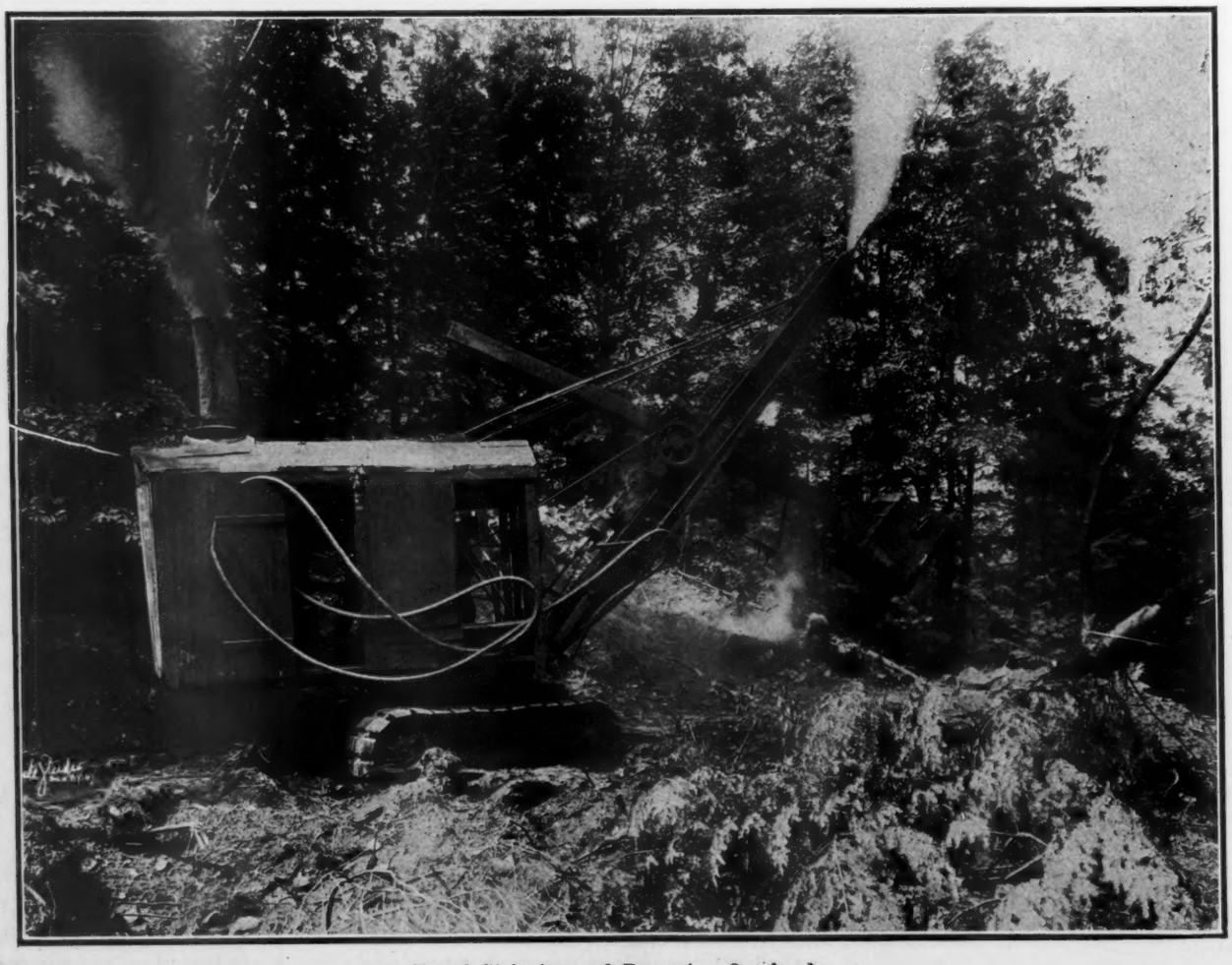
Shortly after acquiring the property, from the Maco concern, the Adirondack Company employed a well known feldspar expert to go over the property. He stated that every indication pointed to a large deposit of high-grade feldspar and recommended that shafts be sunk to reasonable depth. This was done with the result that, in several pits and shafts sunk to a depth of 15 to 25 feet, first quality feldspar was disclosed and considerable of it sold and shipped in car-load lots. While this development was under way a large quantity of spar was hauled to the company's mill at Wilton and crushed for the building material trades for cast-

Removing Feldspar from One of the Pits

Air Drilling at One of the Pits

stone block facings, stucco dash, etc. At the present time development has been made with five main openings or pits, the largest of these being 80 feet wide by 200 feet long with a face depth of 22 feet. Mr. John F. Lyon, a mining engineer of wide experience, has made a thorough report of the property and his findings have determined the presence of a very large deposit of commercially valuable spar which, because of the very favorable mining, or quarrying conditions, can be removed at a comparatively low cost.

From the beginning of its operations the company has followed a consistent policy, its purpose being to determine as far as possible the extent of its mineral deposit and the probable tonnage of feldspar in place, and the most economical methods of mining its product. A large amount of stripping was done and a large size Thew steam shovel was employed in removing a part of the overburden which was, for the most part, of rock formation and difficult to handle. An area of about 350 feet long by 100 feet wide and from 20 to 40 feet in depth was removed to reach the body of high grade spar. The mining and milling conditions at this plant are most favorable. A county highway runs directly through the company's property and, in addition to this, the company has built a private road for its individual use to avoid interference in hauling between the mines and the mill. The method of mining is and probably will continue to be, open mining or quarrying which is comparatively inexpensive.



Shovel Stripping and Removing Overburden

A ¾ yard Thew steam shovel is used to remove the overburden which is carried to the dumps in trucks. Holes are then drilled in the rock with Sullivan and Ingersoll-Rand jack hammer air drills. The plant has two each of these drills for this work. Air for operating these drills is supplied by a Sullivan steam driven air compressor with receiving tank 150 cubic foot capacity and an Ingersoll-Rand, 8 by 6 inch, gasoline driven air compressor. The rock is shot in the usual manner, the charge being fired by electric batteries, two being in service for this purpose. The dynamite used for blasting is kept in a separate magazine with 5 tons capacity some distance from the pit. The material is then placed into the dump trucks, two International Harvester and one Ford 1 ton, all with steel bodies, and hauled to the sorting shed which is a building 20 feet wide by 60 feet long.

Commissary and Bunk House

The following equipment at the mines other than that already mentioned, is a building 14 feet wide by 21 feet long which houses a 30 h.p. engine and upright boiler, which operates the two air compressors used to supply air to the jack hammer air drills. On one side of the engine house is a lean-to building used as a blacksmith shop where repairs to any of the mining tools are made. This building also houses an Ingersoll-Rand drill sharpener with complete equipment. A building used as sleeping quarters for the men, 16 by 45 feet, and a log cabin, 18 by 18 feet, for use by the superintendent have been provided near to the mines.

After the material has been sorted the accepted feldspar is conveyed in the steel-body dump trucks to the mill, about two miles away. The main building at the mill is a structure 40x24x24 feet with power house adjoining which is 24 feet wide by 37 feet long. The equipment at the mill comprises a New Holland, electrically driven, crushing plant. The rock is fed into the crushers and after being crushed to size, is carried by an elevator to revolving screens which separate it into the desired sizes. The material is dropped into storage bins, of which there are five with a capacity for 1,000 tons. The crushers are driven by a General Electric 35 h.p., motor and the elevator and screens are operated by a General Electric motor with 5 h.p. capacity. Handy to the mill is a building 12 feet wide by 14 feet long which is used as a tool shed for keeping small equipment used in this section of the plant. A railroad siding has been

Entrance to Pit Number One. Face is About 100 Feet Wide and 35 Feet High

built, approximately 100 feet long to enable easy exporting of the finished feldspar.

Plans are now under way to double the capacity of the mill and toward this end an aerial tramway will be provided from the mines to the mill so that sorted material may be transferred quicker than by the present truck method. The addition of a pulverizing unit is also under consideration so that pulverized or ground feldspar may be added as another product of the plant. The company's present output capacity is about 50 tons a day which will be doubled within 90 days. It is proposed to bring the production to 200 tons daily early in 1927.

How the States Rank in Mineral Output

Pennsylvania, with its enormous coal output, led all the states in the production of minerals in 1924, the latest year for which complete figures are available, according to the Bureau of Mines, Department of Commerce. The commonwealth's mineral production in that year amounted to $1,011,630,879 and constituted 21.64 per cent of the nation's entire mineral output. In addition to coal, the state was a large producer of cement, clay products and natural gas. California ranked second as a mineral producing state, its tremendous production of petroleum, natural gas, cement and natural-gas gasoline comprising the bulk of its mineral output valued at $428,175,652. Oklahoma, with production valued at $393,030,665, made up largely of petroleum, zinc, natural gas and natural-gas gasoline, ranked third.

West Virginia, whose coal, natural gas, petroleum and clay products constituted the bulk of its mineral production valued at $307,314,205, ranked fourth. Texas was the fifth state, its production valued at $272,729,023, being largely comprised of petroleum, sulphur, natural-gas gasoline and natural gas.

The relative rank of the other states, with the minerals constituting the bulk of their production, is indicated in the following table:

Ohio—Clay products, coal, natural gas, petroleum	$249,049,648
Illinois—Coal, clay products, petroleum, cement	235,796,027
Kentucky—Coal, petroleum, clay products, natural gas	120,510,775
Michigan—Iron ore, copper, cement, clay products	114,239,386
Indiana—Coal, cement, stone, clay products	112,299,075
Minnesota—Iron ore, cement, stone, clay products	107,844,680
Kansas—Petroleum, zinc, coal, natural gas	105,005,476
Arizona—Copper, gold, silver, lead	100,325,413
New York—Clay products, gypsum, cement, stone	95,435,299
Utah—Copper, lead, coal, silver	84,356,626
Missouri—Lead, clay products, cement, coal	81,054,122
Alabama—Coal, iron ore, cement, clay products	77,315,758
Wyoming—Petroleum, coal, natural gas, natural-gas gasoline	75,494,166
New Jersey—Clay products, zinc, cement, sand and gravel	75,271,009
Montana—Copper, silver, coal, zinc	70,631,806
Arkansas—Petroleum, coal, natural gas, bauxite	61,748,999
Colorado—Coal, gold, clay products, lead	61,487,882
Louisiana—Petroleum, sulphur, natural gas, natural-gas gasoline	56,930,681
Iowa—Coal, cement, clay products, gypsum	40,459,869
Virginia—Coal, clay products, stone, cement	37,962,143
Tennessee—Coal, cement, clay products, stone	35,354,525
Idaho—Lead, silver, zinc, gold	27,831,623
Nevada—Copper, silver, gold, gypsum	26,225,943
New Mexico—Copper, coal, zinc, silver	23,913,528
Washington—Coal, cement, clay products, stone	21,159,370
Maryland—Cement, coal, clay products, sand and gravel	18,506,867
Alaska—Copper, gold, coal, silver	17,361,834
Wisconsin—Stone, sand and gravel, lime, iron ore	15,796,720
Massachusetts—Stone, clay products, lime, sand and gravel	15,725,882
Georgia—Clay products, stone, cement, Fuller's earth	14,946,610
Vermont—Stone, slate, lime, talc	14,549,429
Florida—Phosphate rock, stone, Fuller's earth, sand and gravel	13,101,223
North Carolina—Clay products, stone, sand and gravel, feldspar	9,261,467
Connecticut—Clay products, stone, sand and gravel, lime	8,129,332
Oregon—Cement, stone, sand and gravel, clay products	7,364,232
South Dakota—Gold, stone, sand and gravel, silver	6,884,433
Maine—Stone, lime, clay products, slate	6,035,160
South Carolina—Stone, clay products, sand and gravel, calcareous marl	3,444,366
New Hampshire—Stone, clay products, sand and gravel, feldspar	3,378,165
Nebraska—Sand and gravel, cement, clay products, stone	3,209,425
North Dakota—Coal, clay products, sand and gravel, tungsten ore	2,776,720
Mississippi—Sand and gravel, clay products, stone	2,090,422
Rhode Island—Stone, clay products, lime, sand and gravel	1,132,641
District of Columbia—Sand and gravel, clay products, sand lime brick, stone	813,668
Delaware—Stone, clay products, sand and gravel	512,105

Unusual Find of Borax

Anyone would hesitate to hunt for a borax deposit beneath the featureless surface of sand and gravel of a broad alluvial plain, such as is common in the deserts of Southern California. Nevertheless, in 1913 a well drilled in ground of this sort on the ranch of Dr. John K. Suckow, in Kern County, struck colemanite, the principal ore of borax, after penetrating bedrock beneath the alluvial cover. Considerable exploratory work followed this discovery, and the district is believed to be of considerable promise. The claims are now said to have all passed into the control of the Pacific Coast Borax Company.

Little geologic information has hitherto been available regarding this occurrence, but in 1924 L. F. Noble, of the Geological Survey, Department of the Interior, in company with H. S. Gale, had an opportunity to examine a shaft and tunnel then being opened by the Suckow Chemical Company in the middle of the area in which the deposits occur. It was thus possible to ascertain the character and structure of the rocks that include the borax minerals and to examine one of the deposits that had been freshly cut. The results of this investigation, together with notes on the geology of some neighboring related areas, are set forth in Bulletin 785-C, recently published.

PIT AND QUARRY FOREIGN DIGEST

British Standard Specifications Portland Blast Furnace Cement 1926

Principal changes from the 1923 standards are: (1) In climates where the temperature runs above 95 degrees or below 58 degrees F. special arrangements must be made between vendor and purchaser unless the ranges can be artificially produced. (2) Cement must be ground until residue on a 180x180 sieve is 10 per cent instead of the previous 14 per cent. Design of sieve is altered. (3) Maximum hydraulic modulus for Portland cement raised to 2.90; maximum limit for magnesia is now 4 per cent. (4) Minimum tensile breaking strength of neat cement after 7 days has been increased to 600 pounds per square inch and that of cement and sand after 7 days to 325 pounds. The 28-day test on neat cement has been eliminated. (5) Initial setting time of normal setting cement not less than 5 minutes. (British Engineering Standards Association Report, 146, 1926.)

Adhesion Between Steel and Plaster of Paris

Highest adhesion is obtained with rusty bars. Perfectly dry lead oxide coating adheres better than bare steel. Rendering with cement grout gives good results only if plaster is kept dry. Adhesion in damp plaster as a rule is about one half that in dry. (M. Anstett—Revue de Materiaux de Construction, 1926.)

Fused Aluminous Cements

Gives brief history of development of hydraulic binding materials to 1924.

At the beginning of 1924, the high quality Portland cement appeared on the market for the first time. It was Portland cement sintered almost up to 1600 degrees C. and ground to an exceedingly fine grain. "Bauxiteland" has been offered in the technical journals for about a year, and is made by sintering a mixture low in silica, high in iron oxide and bauxite. Its strength is equivalent to that of an average high-quality Portland cement. In 1908, Bied in France made his important discovery of "Ciment-Fondu." Recent German patented improvements in the process of manufacture include (1) continuous fusion in similar apparatus to that for production of coal gas with materials added so that the molten slag contains 40 to 60 per cent CaO and a larger amount of AL_2O_3 than SiO_2. (2) Mixtures of 11-20 per cent SiO_2, 16-33 per cent Fe_2O_3; 8-16 per cent AL_2O_3 and 45-55 per cent CaO are fused. (3) A fused cement made by fusing sulphur containing raw materials, either alone or with known mixtures in such proportions that after fusing, a cement is obtained which corresponds in composition and characteristics with the French Bauxite cement. (Berl and Loblein—Zement—vol. 15, p. 642-3.)

A curing of fused cement in saturated gypsum solution merely retarded the setting. This cement is also stable to 10 per cent solutions of NaCl, $MgCl_2$, and $CaCl_2$. Five per cent sodium bicarbonate solution vigorously attacks aluminous cement, but not Portland cement. In the paving of streets use of fused cement makes an interruption of traffic of only 4 days necessary while Portland cement requires at least a 10 day break. Fused cement can be used for concrete work in cold weather, because the heat evolved during its setting eliminates danger of freezing and deterioration. It is peculiarly suited for marine structures and also for spans of bridges, due to its great elasticity. (Berl and Loblein—Zement—Vol. 15, p. 696-697.)

Fused aluminous cements were investigated by means of the use of chemically pure components, (calcium oxide, alumina and silica) of this ternary system; and by fusions made in similar manner to that used for the technical manufacture of these cements from bauxite and lime. Extensive tables are included. (Anon.—Zement—Vol. 15, p. 697-699, 1926.)

Other Alumina containing substances besides clay rich in silicic acid are used for the formation of this cement. Aluminous silicates such as clay marl, kaolin, slags, coal ash, etc., are employed. Fluor spar and alumina can be used to flux and bind the silicic acid. In case fluorspar is used, the fluorine ultimately goes off in the form of Silicon fluoride. (German Patent, 96,545.)

Optical Behavior of Materials of Lime-Silica-Acid-Alumina in Short Light Waves

In ultra violet light substances composed of various combinations of this system show differences in color, as for example, pieces of CaO, SiO_2—light violet, while 3 CaO, SiO_2 is gray-green, 5 CaO, AL_2O_3 is green and CaO, Al_2O_3 black-violet. Graphs have been prepared using triangular coordinates showing colors of different compounds of this system. Analyses were made of commercial materials by picking out constituent particles with a forceps, using a microscope in ultra-violet light. A slag sand was divided into brick-red, white and dark violet constituents, each of which groups was made up of a different compound. It is believed that such differentiation by ultra-violet light will serve along with chemical analyses as a valuable means of examination of cements, slags, etc. (Grun and Kunze—Zement, Vol. 15, p. 677-679, 1926.)

Burning Cement Slurry

In a process for burning slurry in rotary kilns,

for instance, as in the making of Portland cement, the nodules formed by drying the slurry in the drying zone of the kiln are ground before they pass to the calcining zone. Grinding chambers may be attached to the kiln and communicate therewith through inlets for the nodules and outlets for the ground material. (English Patent 255,569.)

Concrete Building Blocks

A rectangular piece of sheet metal is bent into a shape so that it will form the core of the block. Concrete is poured into the bottom of the mold, the metallic core laid on top and the latter then entirely surrounded by concrete in the mold. This makes a hollow concrete block with a metallic core. (English Patent 255,596.)

Paving Stones

Paving stones are molded from a mixture of 65-75 per cent granite or stone chippings with 35-25 per cent of blast furnace or coal tar pitch, having a twisting point between 40-65 degrees C. Five per cent of the pitch may be substituted by bitumen. (English Patent, 255,421.)

Determination Soluble Silicic Acid in Cements and Mortars

One gm cement or 4 gm mortar are treated with 50-60 c.c. conc. HCL spc. gr. 1.12, filtered, and silicic acid determined in the filtrate. This procedure leaves the silicic acid of the clay and sand unattacked. Portland cement contains about 21 per cent, fused cement 8.5 per cent, slag cement 24 per cent. (Comptes Rendu des Sciences, V. 83, p. 53-55.)

Contrivance for Testing Settling Time of Cements

Two electric conductors of different materials, such as copper and zinc plates, are inserted into the wet cement, and the electric tension between them measured. A sharp change in tension as shown by irregularity in the curve determines the setting time. (German Patent, No. 430,768.)

Acid Proof Cements

Acid-proof cements consist of a mixture of water-glass solution with a powdered modification of silica capable of strong reaction with alkali, such as opal, chalcedony, flint, etc. Silica suitable for this purpose shows a loss in weight of 40 per cent after boiling for two hours with 25 times its weight of 15 per cent caustic soda solution. The cement may be improved by the addition of chamotte or alkaline earth sulphates. (English Patent, 256,258.)

(Continued from page 88)

B. G. Dann, Hendrick Mfg. Co., Carbondale, Pa.

S. F. Macpeak, Earle C. Bacon, Inc. New York City.

James Savage Buffalo Crushed Stone Co., Buffalo, N. Y.

F. W. Schmidt, Jr., Morris County Crushed Stone Co., Morristown, N. J.

Fred A. Gill, Gill Rock Drill Co., Lebanon, Pa.

R. A. Wholley, Blaw-Knox Co., P. O. Box 915, Pittsburgh, Pa.

Thos. Robins, Jr., Robins Conveying Belt Co., New York City.

John Rice, Jr., General Crushed Stone Co., Easton, Pa.

J. C. Farrell, Easton Car & Construction Co., Easton, Pa.

H. M. Davison, The Hayward Co., New York City.

Judson Hayward, The Hayward Co., New York City.

C. B. Andrews, Taylor Wharton Iron & Steel Co., High Bridge, N. J.

J. C. Houston, Browning Crane Co., Cleveland, Ohio.

John C. Taylor, Taylor Wharton Iron & Steel Co., High Bridge, N. J.

W. L. Sporborg, Rock-Cut Stone Co., Syracuse, N. Y.

N. C. S. A. Committee on Welfare and Safety Meets in New York

At the call of Chairman Greensfelder the newly organized committee on Welfare and Safety of the National Crushed Stone Association, held its first meeting at the Commodore Hotel, New York City on Friday, October 15. The following members of the committee were present: N. S. Greensfelder, Oliver Bowles and W. W. Adams, cooperating members from the U. S. Bureau of Mines; J. F. Heimlick, D. C. Souder, John Rice, Jr., and J. R. Boyd. There were also in attendance, O. M. Graves, president of the National Association; A. T. Goldbeck, director of the Bureau of Engineering of the National Association, and John Rice, member of the Board of Directors of the National Association.

The meeting was called for the purpose of planning a campaign of action for promoting welfare and safety in the crushed stone industry. After briefly outlining the proposed work of the committee Chairman Greensfelder called upon W. W. Adams of the Statistical Division of the U. S. Bureau of Mines in Washington who offered the fullest possible cooperation of the Bureau of Mines in furthering this most important work.

Oliver Bowles, of the non-metallic station of the U. S. Bureau of Mines at New Brunswick, New Jersey, was then called upon and gave the committee many valuable suggestions. D. C. Souder also gave the committee the benefit of his experiences in safety work with the France Stone Company. After pro and con discussion the meeting adjourned with the feeling that excellent progress had been made and that very definite recommendations could be made on this subject to the Detroit Convention in January.

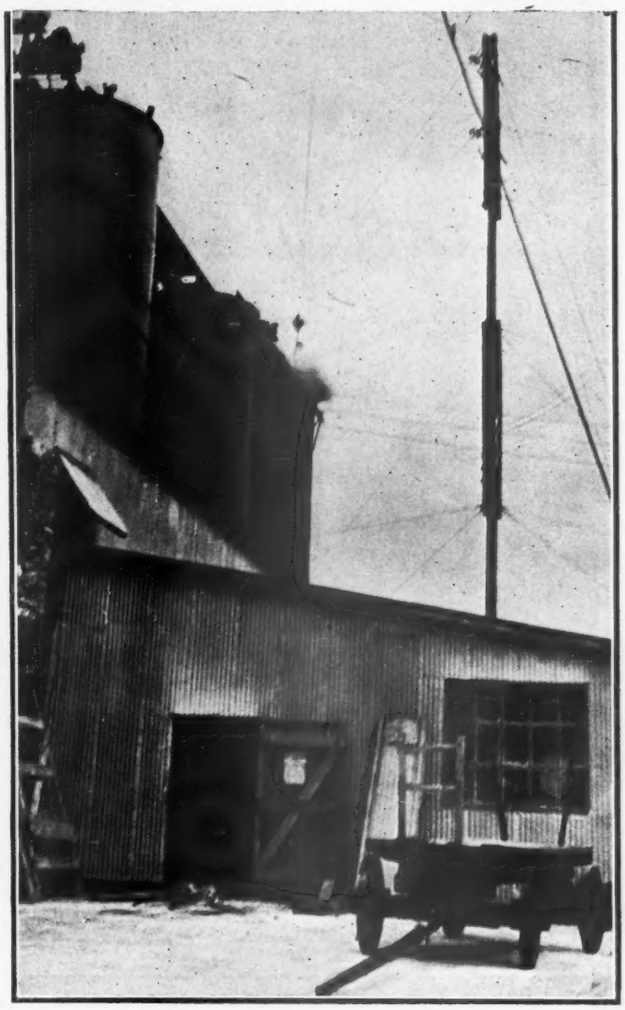
Domestic production of potash in 1925 amounted to 51,544 short tons of crude potash salts, containing 25,459 short tons of potash (K_2O), which is equivalent to about one-tenth of the potash content of salts imported during the year. This production was from natural brines in California, dust from steel plants in Pennsylvania, and distillery residue from molasses at a plant in Maryland.

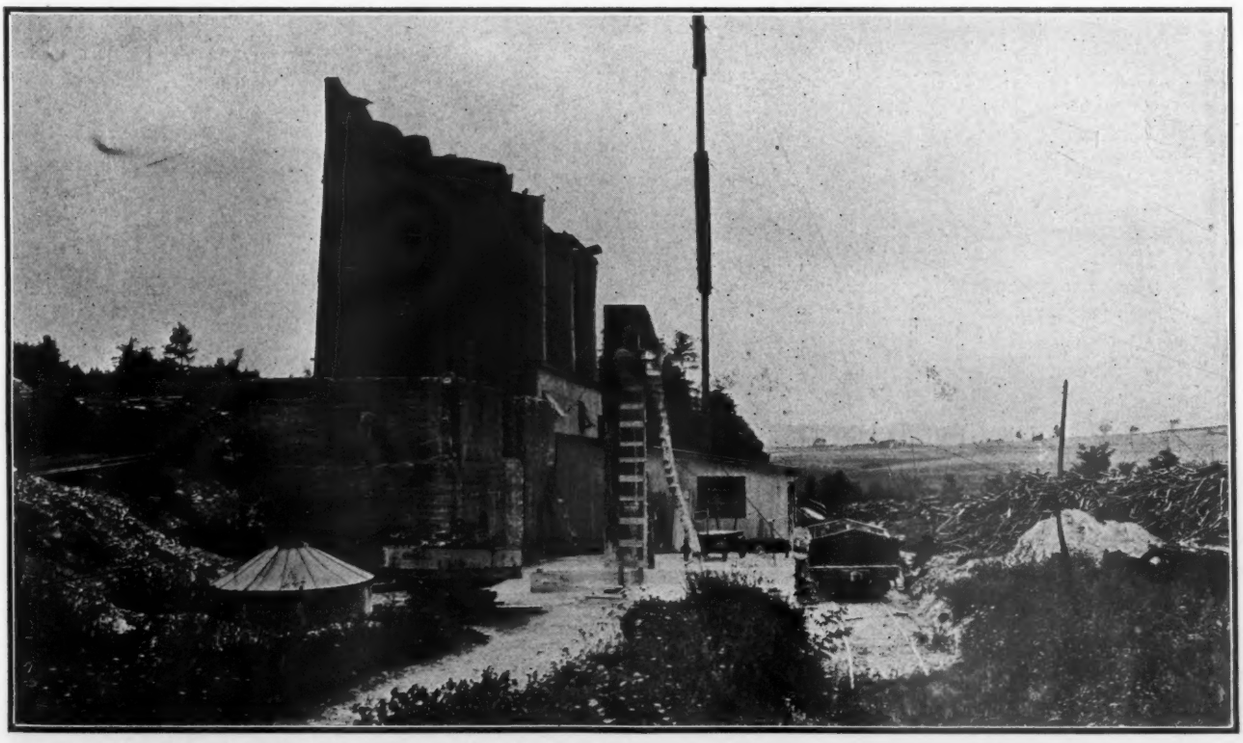
GREEN MOUNTAIN LIME COMPANY TO REBUILD

LAST autumn there was a fire at the plant of the Green Mountain Lime Company, New Haven Junction, Vermont, which did much damage but sufficient reconstruction has been already accomplished to restore three of the five kilns to service. The quarry is a large one as is shown by the illustrations. Stone is transported from the quarry to the kilns by a rather long cableway extending the full length of the quarry and over the kilns. The skips are operated by a hoist made by the Fair Haven Foundry and Machine Company and motor drive is by a Link Belt silent chain. The buildings and remainder of the kilns are to be rebuilt at an early date and a hydrating plant is to be added. As soon as the plant is again in full operation it will be described in a future issue of Pit and Quarry.

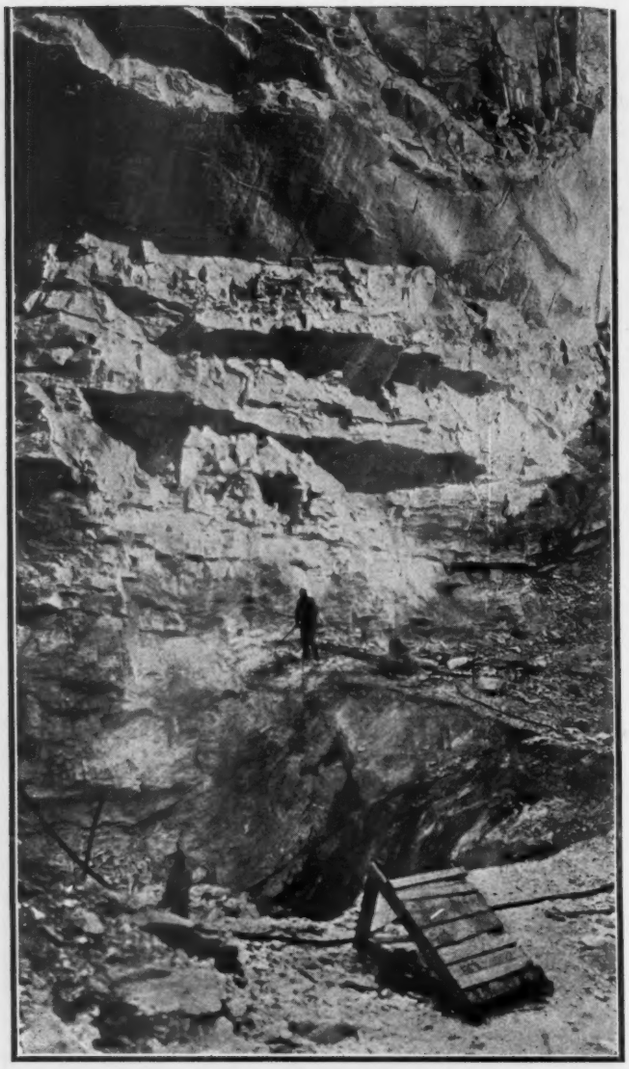
The plant is very conveniently situated near the main line of the Rutland Railroad with a spur to the loading door of the lime drawing floor. The new building where the lime is drawn and barreled is made of corrugated galvanized steel.

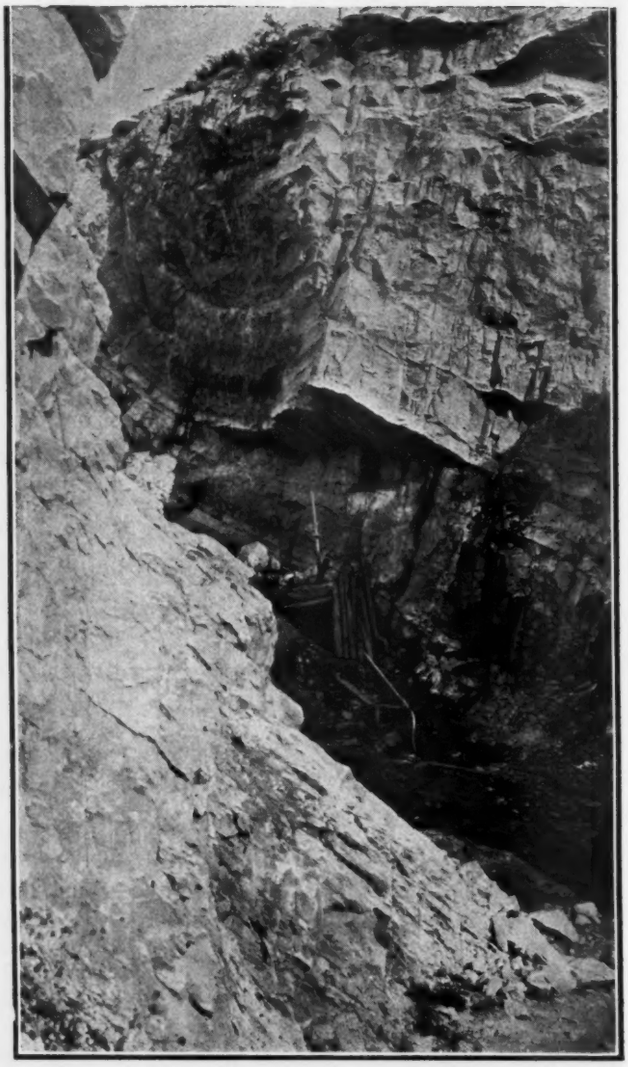
The lime produced is a high calcium lime which is marketed for agricultural, chemical and construction purposes. The new hydrating plant will enable the Green Mountain Lime Company to serve a more extensive market. H. D. Brewer is president, treasurer and purchasing agent of the company. R. W. Foster is manager of operations.





Top—Kilns and Building After Being Repaired. Bottom—View of Kilns Showing Damage Caused by the Fire.



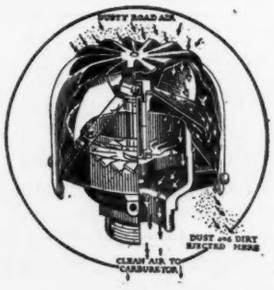


Top—Views Showing Unusual Stratification of Rock. Bottom—Interior of Lime Drawing Floor, Showing Barrels of Lime Ready for Shipment

Air Cleaners

Recently manufacturers of all types of automotive and industrial units have evidenced a considerable interest in air cleaning devices. This is particularly true among builders of such machinery that might be operated under extremely dusty conditions. Unless the carbureter intake is protected by an air cleaning device, the amount of dust drawn into the engine is sufficient to cause considerable wear on practically all of the internal parts. This means, of course, that the engine must be taken down and thoroughly overhauled at frequent intervals and the maintenance cost is kept at an unnecessarily high point. Many manufacturers are now using an air cleaner with extremely gratifying results and many others will follow suit shortly, it now being an established fact that an air cleaner protects the engine and multiplies its life.

Perhaps the oldest and most widely known of all commercial air cleaners is the United, an engraving of which is shown below. It has been successfully marketed for some five years and, while gradual evolution has changed its size and shape considerably, the principles embodied in its original conception remain unaltered. The manufacturers of the device are thoroughly convinced that the design is fundamentally the acme of air cleaner perfection.



The United air cleaner differs from all other types in that it is the only one in which there is a moving part. An extremely high degree of dust separation efficiency is attained because of the rotating member. The air stream on its way from the cleaner to the carbureter passes through the turbine causing the complete rotor assembly to revolve at a high speed. The resulting centrifugal force throws the heavier than air particles outward against the shell, and the flow of air not passed along to carbureter is used to eject these particles at the base of the cleaner shell. This provision for removing, rather than collecting the separated dust, renders the United air cleaner selfcleaning and relieves the operator of any concern relative to the continued efficient functioning of his air cleaner.

It will be readily recognized that because of the moving part, the air inside the cleaner moves at a greater velocity than it did upon entering. The centrifugal force available for separating dust is, therefore, greater than in a cleaner without a moving part. The manufacturers claim that their experience proves that the rotating member does not wear out readily and cannot, therefore, be considered objectionable from that standpoint.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20 cents each. State number of patent and name of inventor when ordering.

1,599,404. Tile-forming mechanism. Claus O. Brandell, Chicago, Ill., assignor to Concrete Tile Machinery Co., Cicero, Ill.

1,599,413. Process of making artificial stone. Herbert C. Harrison, Lockport, N. Y., and Charles H. Harrison, Algers Manor, Gloucestershire, England.

1,599,630. Dipper-handle end. William M. Bager and Werner Lehman, South Milwaukee, Wis.

1,599,903. Process for waterproofing Portland cement. Edwin C. E. Lord, Washington, D. C., dedicated to the public.

1,600,242. Screed for concrete-paving machines. William Ord, Chicago, Ill.

1,600,245. Mining-machine. Thomas E. Pray and George Bodin, Chicago, Ill., assignors to Goodman Mfg. Co., same place.

1,600,353. Process of constructing culverts or pipes of concrete. Toichi Nose, Kanagawa-Ken, Japan.

1,600,780. Gyratory crusher. Edgar B. Symons, Hollywood, Calif., assignor to Symons Brothers Co., Bakersfield, Calif.

1,600,792. Screen. John Bland, Chicago, Ill.

1,600,900. Quarry block-sawing machine. Howard E. Marsh, Lompoc, Calif.

1,601,007. Plant for manufacturing road-making material. Joseph Temperley, London, England.

1,601,182. Construction of concrete poles. Charles D. McArthur, Pittsburgh, Pa., assignor to Blaw-Knox Co., same place.

1,601,347. Mold for concrete driveways and the like. Frank S. Church, Cincinnati, Ohio.

1,601,956. Lining for rotary pulverizers. John R. Gammeter, Akron, Ohio, assignor to B. F. Goodrich Co., New York, N. Y.

1,602,035. Collapsible form of concrete blocks. William D. McLaughlin, Modesto, Calif.

1,602,156. Mining-machine. Morris P. Holmes, Claremont, N. H., assignor to Sullivan Machinery Co., same place.

1,602,431. Insert for concrete walls and the like. Fred W. Honens, Sterling, Ill.

1,602,434. Mill. Oscar H. Johnson, Denver, Colo., assignor to Mine & Smelter Co., same place.

1,602,435. Mill. Oscar H. Johnson, Denver, Colo., assignor to Mine & Smelter Co., same place.

1,602,562. Power excavator. Edwin J. Armstrong, Erie, Pa., assignor to Erie Steam Shovel Co., same place.

1,602,575. Concrete form. Fritz H. Franson, Denver, Colo.

1,602,734. Gyratory crushing machine. William S. Weston, Columbia, S. C.

New Incorporations

Searles Slate Co., $100,000. H. H. Searles, L. E. Eaton. (Filed by W. J. Dodge, 66 Broadway, New York City.)

Salem Lime & Stone Co., Salem, Ind., $15,000. Manufacture and sell lime and stone. Thomas M. Cavanaugh, Thomas S. Bellows, Edward Cavanaugh, Wilber W. Hottel, Luther C. Brown.

Ideal Concrete Stone Co., contractors, Frederick, Md., $100,000.

Standard Tile & Marble Co., Minneapolis, Minn. Authorized capital stock, $50,000; proportion represented in Wisconsin, $5,000; no Wisconsin agent.

Aroostook Lime Co., Inc., Caribou, Me. Quarry lime and manufacture it into various commercial forms. 1,000 shares Class A, par value of $10; 2,000 shares Class B, no par value; six shares subscribed. Pres., Joseph E. Hall; Treas., J. B. W. Hall; George H. Sharp.

Southern Lime Products Corp., Wheeling, W. Va., $150,000. A. S. Burger, 117 Elm St., Edgewood.

Ball-Newark Gravel Co., Newark, Ark., $50,000. J. J. Ball, Pres., Little Rock; W. D. Cammack, V. P.; Chas. M. King, Sec'y-Treas.; Wm. J. Camp, director, Batesville; Miss Izy Creger, director. Messrs. Ball, Cammack and King are owners of the Ball-Benton Gravel Company's plant at Benton, Ark., which is not affected by the new organization.

Vernon Material Co., Prairie View, Ill. 300 shares n. p. v. To operate gravel pits. Ernest Schroeder, Frank P. Perkins, Frank S. Salchenberger. Cor., Charles A. Phelps, 38 S. Dearborn St., Chicago, Ill.

DISTRIBUTION OF CEMENT

Portland Cement Shipped from Mills into States, in July and August, 1925 and 1926, in Barrels*

Shipped to	July		August	
	1925	1926	1925	1926
Alabama	256,741	184,577	277,605	173,619
Alaska	2,816	1,386	264	1,130
Arizona	37,842	35,817	33,328	45,553
Arkansas	78,059	73,292	88,143	71,312
California	1,061,048	1,173,099	1,154,523	1,165,387
Colorado	118,272	117,990	118,335	133,172
Connecticut	176,644	218,375	†194,911	224,946
Delaware	43,326	38,228	50,949	35,287
District of Columbia	82,133	94,852	83,155	75,684
Florida	341,849	284,281	310,457	330,285
Georgia	132,050	213,432	136,542	188,201
Hawaii	993	12,761	1,108	8,895
Idaho	28,498	47,991	31,846	44,589
Illinois	1,853,734	1,857,890	1,790,148	1,806,425
Indiana	658,042	696,653	690,624	694,894
Iowa	327,155	353,529	375,407	412,046
Kansas	226,787	230,022	254,074	260,169
Kentucky	229,652	198,902	220,859	174,283
Louisiana	99,111	112,958	105,440	121,260
Maine	41,475	67,475	†37,277	108,161
Maryland	247,835	221,600	235,983	208,790
Massachusetts	386,058	331,320	†356,341	349,319
Michigan	1,229,598	1,505,905	1,194,934	1,567,764
Minnesota	436,453	475,846	472,018	437,014
Mississippi	67,446	89,752	70,141	80,109
Missouri	683,097	653,615	723,916	611,020
Montana	31,486	38,749	31,638	31,256
Nebraska	203,863	172,489	210,305	201,211
Nevada	10,068	7,878	12,635	9,088
New Hampshire	41,843	55,233	52,941	49,958
New Jersey	760,944	793,625	653,685	691,453
New Mexico	16,323	14,736	17,246	21,231
New York	2,170,960	2,336,788	†2,151,191	2,329,217
North Carolina	343,683	396,618	340,027	376,779
North Dakota	55,305	62,581	37,735	43,493
Ohio	1,099,016	1,247,338	1,212,138	1,199,908
Oklahoma	225,729	205,345	286,912	236,223
Oregon	143,672	151,296	157,360	128,525
Pennsylvania	1,869,377	1,618,569	†1,852,731	1,493,733
Porto Rico	0	0	0	0
Rhode Island	75,383	65,525	†71,369	66,573
South Carolina	75,376	53,506	92,255	62,408
South Dakota	55,487	46,987	57,380	44,054
Tennessee	208,562	213,058	193,279	207,528
Texas	418,401	481,008	404,161	484,822
Utah	38,975	50,306	45,985	54,276
Vermont	26,245	38,607	23,698	49,660
Virginia	180,025	180,085	176,842	182,011
Washington	334,466	239,146	323,325	198,993
West Virginia	164,874	214,901	177,994	162,440
Wisconsin	562,363	704,770	626,004	715,784
Wyoming	25,691	19,973	31,042	24,901
Unspecified	48,647	774	†10,520	70,497
	18,033,478	18,701,439	18,258,726	18,465,336
Foreign Countries	97,522	84,561	124,274	70,664
Total shipped from cement plants	18,131,000	18,786,000	18,383,000	18,536,000

*Includes estimated distribution of shipments from three plants in July and August, 1925, and from four plants in July and August, 1926. †Revised.

Production, Shipments, and Stocks of Finished Portland Cement, by Districts, in September, 1925 and 1926, and Stocks in August, 1926, in Barrels

Commercial District	Production September		Shipments September		Stocks at end of September		Stocks at end of August, 1926*
	1925	1926	1925	1926	1925	1926	
East. Pa., N. J. & Md.	3,685,000	3,936,000	4,428,000	4,593,000	1,048,000	2,718,000	3,375,000
New York	910,000	948,000	1,072,000	1,194,000	465,000	596,000	842,000
Ohio, West. Pa. & W. Va.	1,620,000	1,797,000	1,905,000	1,903,000	1,232,000	1,930,000	2,036,000
Mich.	1,087,000	1,415,000	1,245,000	1,614,000	716,000	1,062,000	1,261,000
Wis., Ill., Ind. & Ky.	2,403,000	2,326,000	2,697,000	2,451,000	1,828,000	1,799,000	1,925,000
Va., Tenn., Ala., & Ga.	1,289,000	1,368,000	1,341,000	1,428,000	271,000	1,029,000	1,089,000
Eastern Mo., Ia., Minn. & S. Dak.	1,591,000	1,470,000	1,781,000	1,556,000	1,890,000	1,993,000	2,078,000
West. Mo., Neb., Kan. & Okla.	1,122,000	1,046,000	1,055,000	970,000	1,498,000	1,407,000	1,331,000
Texas	399,000	437,000	372,000	438,000	288,000	417,000	418,000
Colo., Mont. & Utah	245,000	247,000	236,000	288,000	417,000	384,000	425,000
California	1,223,000	1,272,000	1,199,000	1,318,000	451,000	458,000	504,000
Ore. & Wash.	365,000	309,000	380,000	334,000	143,000	409,000	434,000
	15,939,000	16,571,000	17,711,000	18,087,000	10,247,000	14,202,000	15,718,000

*Revised.

Estimated Clinker (Unground Cement) at the Mills at End of Each Month, 1925 and 1926

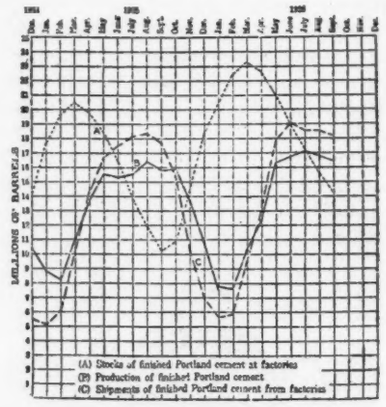
Month	1925	1926	Month	1925	1926
January	7,017,000	9,074,000	July	6,961,000	8,515,000
February	9,497,000	10,931,000	August	5,640,000	*7,362,000
March	9,962,000	12,284,000	September	4,561,000	6,095,000
April	9,731,000	12,934,000	October	4,086,000	.....
May	9,053,000	11,649,000	November	5,013,000	.....
June	7,937,000	10,086,000	December	6,469,000	.....

*Revised.

SEPTEMBER CEMENT STATISTICS

September production and shipments were the highest for any month in the history of the industry, showing increases of 4 and 2 per cent, respectively, over September, 1925, according to the bureau of mines, department of commerce. During the nine months ending September 30, 1926, the shipments of Portland cement amounted to 126,467,000 barrels, exceeding the shipments for the corresponding period in 1925 by 2,156,000 barrels. Portland cement stocks decreased but at the end of September, 1926, were greater by more than 38 per cent than on September 30, 1925.

These statistics, prepared by the division of mineral resources and statistics of the bureau of mines, are compiled from reports for September, 1926, received direct from all manufacturing plants except two, for which estimates were necessary on account of lack of returns.



Silent Hoist Moves

The Silent Hoist Winch and Crane Company announces the removal of their works and general offices to their new building at 762-772 Henry street, Brooklyn, New York.

This company manufactures winches, cranes and derricks for motor trucks and electric and gasoline car pullers, hoists and winches. With the new and larger quarters it will be possible more adequately to meet requirements for the products manufactured by this company.

Speeder Appoints

The Speeder Machinery Corporation has recently appointed the following equipment distributors as representatives in their respective territories: Thos. G. Lund Company, Salt Lake City, Utah; M. B. Tyler Company, Springfield, Mass.; Charles J. McCarthy and Company, Boston, Mass.; Ellis Brothers, Havana, Cuba and E. C. Hingston Company, Chicago, Ill.

Production, Shipments, and Stocks of Finished Portland Cement, by Months, in 1925 and 1926, in Barrels

Month	Production		Shipments		Stocks at end of month	
	1925	1926	1925	1926	1925	1926
January	8,856,000	7,887,000	5,162,000	5,674,000	17,656,000	20,582,000
February	8,255,000	7,731,000	6,015,000	5,820,000	19,689,000	22,384,000
March	11,034,000	10,355,000	10,279,000	9,539,000	20,469,000	23,200,000
1st quarter	28,145,000	25,973,000	21,456,000	21,033,000	.....	.....
April	13,807,000	12,401,000	14,394,000	12,961,000	19,877,000	22,640,000
May	15,503,000	16,472,000	16,735,000	17,951,000	18,440,000	21,173,000
June	15,387,000	16,827,000	17,501,000	19,113,000	16,409,000	18,900,000
2nd quarter	44,697,000	45,700,000	48,630,000	50,025,000	.....	.....
July	15,641,000	17,096,000	18,131,000	18,786,000	13,896,000	17,210,000
August	16,419,000	16,936,000	18,383,000	18,536,000	11,952,000	*15,718,000
September	15,939,000	16,571,000	17,711,000	18,087,000	10,247,000	14,202,000
3rd quarter	47,999,000	50,603,000	54,225,000	55,409,000	.....	.....
October	15,992,000	.....	15,309,000	.....	10,979,000	.....
November	13,656,000	.....	10,187,000	.....	14,534,000	.....
December	10,713,000	.....	6,917,000	.....	*18,515,000	.....
4th quarter	40,361,000	.....	32,413,000	.....	.....	.....
	161,202,000	.....	156,724,000	.....	.....	.....

*Revised.

EXPORTS AND IMPORTS*

Exports of Hydraulic Cement by Countries, in August, 1926

Exported to—	Barrels	Value
Canada	2,775	$ 12,675
Central America	1,928	5,759
Cuba	8,548	21,274
Other West Indies	7,907	19,445
Mexico	10,371	31,100
South America	27,620	96,038
Other countries	5,797	30,198
	64,946	$216,489

Imports of Hydraulic Cement by Countries, and by Districts, in August, 1926

Imported from—	District into which imported—	Barrels	Value
Belgium	Florida	22,400	$ 26,282
	Galveston	2,996	4,348
	Hawaii	17,998	26,818
	Maine and New Hampshire	13,333	19,297
	Massachusetts	78,084	107,722
	Mobile	9,586	14,621
	New Orleans	19,826	26,252
	New York	602	761
	Oregon	16,526	28,596
	Philadelphia	63,971	102,699
	Porto Rico	995	2,100
	San Francisco	1,763	2,524
	Washington	16,681	21,082
	Total	264,761	$383,102
Canada	Maine and New Hampshire	138	487
	St. Lawrence	2,985	6,290
	Vermont	268	470
	Total	3,391	$ 7,247
Denmark and Faroe Islands	Porto Rico	31,907	58,768
Esthonia	New York	24,658	70,709
France	Massachusetts	12,981	18,401
	New York	8,936	14,446
	Total	21,917	$ 32,847
Japan	Hawaii	2,997	5,776
United Kingdom	New York	1,007	2,083
	Grand total	350,638	$560,532

Exports and Imports of Hydraulic Cement, by Months, in 1925 and 1926

Month	Exports				Imports			
	1925		1926		1925		1926	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	71,596	$ 207,547	72,939	$216,431	231,258	$ 364,196	360,580	$576,717
February	56,249	181,356	73,975	220,706	119,077	206,308	314,118	527,948
March	65,248	200,410	69,080	205,647	218,048	337,039	493,241	812,968
April	89,508	263,831	96,296	284,772	197,686	280,826	257,302	398,114
May	85,385	250,845	78,601	224,365	186,897	286,959	223,130	337,031
June	71,343	217,899	80,684	248,814	254,937	409,539	335,570	495,744
July	98,141	286,543	130,822	370,220	335,118	499,602	250,862	395,981
August	103,961	289,904	64,946	216,489	379,847	611,551	350,638	560,532
September	102,649	285,225	.....	.....	513,252	789,121	.....	.....
October	73,369	228,467	.....	.....	535,050	824,268	.....	.....
November	101,825	294,201	.....	.....	388,604	678,518	.....	.....
December	100,323	296,900	.....	.....	295,543	526,001	.....	.....
	1,019,597	$3,003,128	.....	.....	3,655,317	$5,813,928	.....	.....

The Lincoln Arc Welder

The Lincoln Electric Company has recently published a booklet "Automatic Arc Welding with Lincoln Stable-Arm Automatics" which is both interesting and instructive to the welding industry.

The machines consist of the following elements: A fixture for holding the work to be welded; an automatic electrode holder; a mechanism for moving the electrode holder along the seam and a source of welding current. The following is a brief description of these "Stable-Arc" automatics. The Carbon-arm principle of arc welding is used, that is, the welding is formed between the work to be welded and a carbon electrode. This carbon electrode is held in a holder which is so mounted that the arc moves along the seam at the proper welding speed. The plates to be welded are clamped in place so that the edges to be joined are parallel and as close together as possible. A filler rod, usually of mild steel, is placed along the seam. The purpose of this rod is to supply additional metal to reinforce the weld. The seam is surrounded on both sides and on the bottom with copper strips. These copper strips form a mold which retains the molten metal during the welding of the seam.

The book contains valuable data for butt, lap and edge welding; speed in feet per hour; approximate current; size of filler rod; size of carbon; total cost per foot for various thicknesses of plate. Drawings of the various types of joints and how the welds are fabricated and also half tones of some completely welded units also add to the value of this book.

Kennedy Gyratory Crushers

A bulletin has recently been issued by the Kennedy-Van Saun Manufacturing and Engineering Corporation giving extracts from letters received by them from satisfied users of the Kennedy Gyratory Crushers.

These crushers are operated without gears or countershaft and do not contain any wearing ring. The machines are designed with small bearing surfaces to insure a light running machine. The crusher breaks the stone, instead of grinding it, reducing abrasion of the wearing parts to a minimum. A continuous return system of lubrication with an oil filter is another feature of this machine.

The crusher can be operated either by a built in synchronous motor in the pulley or by a belt from a standard motor. Capacities of the machines are from 15 to 2,500 tons an hour.

Measures Aggregate by Weight

The enormous waste incurred in distributing materials by the yard method prompted John Markman to perfect a machine which would make it possible to accurately measure materials by weight. This waste incidental to the yard method has prompted certain localities to specify that concrete aggregates be measured by weight. Since John Markman invented his Markman Automatic Weigher, many producers have come to realize that the losses through the old method of distribution by the yard can be prevented by the use of the Markman Automatic weigher which accurately measures the materials by weight.

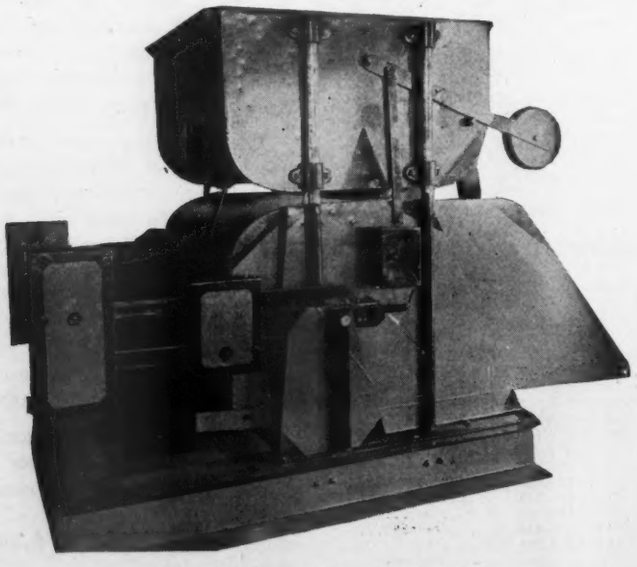
The illustration shows the machine invented and manufactured by John Markman. Its operation is extremely simple, absolutely automatic and yet it provides an accurate record of every pound of material loaded in a given time. The material is poured into the receiving hopper at the top, passing on through to the dumping chute immediately below. When the material in the dumping chute reaches the right weight, this machine may be set for any load between 300 and 2,000 pounds, the chute is automatically released, dumping the accurately weighed material into receptacles below. At the same time the chute releases, a door in the receiving hopper automatically closes, holding back the material until the weight of the load offsets the counterbalances, bringing the dumping chute back to its loading position. This cycle of loading, weighing and dumping is automatically performed as long as material is poured into the receiving hopper. An automatic tally registers each time the dumping chute is released.

This machine has been designed and manufactured to resist hard, strenuous, continuous wear. The machine sets on a flat base built of 8 inch eye beams six feet in length. The cross members, which are electrically welded, are also made of similar section of steel beam as the longitudinal members. These elements when fastened together provide a unit base of sufficient rigidity to withstand sudden shocks and wear common to machinery of this nature.

The chute or weighing hopper is 36 inches wide, 30 inches deep, 72 inches in length and built of tank steel. All the seams are electrically welded to form a one piece element. This weighing hopper is connected to the base by heavy angles through which run the axle and axle housing. The axle is made with liberal strength in keeping with the rest of the machine being 2 inches diameter.

The loading hopper is also made of steel and has a capacity from 300 to 400 pounds, depending on the material. The material is conducted into the weighing hopper through a specially designed gate which, while loading, is open for a space of 5 inches in height and 34 inches in length. This size of opening permits rapid loading of the weighing hopper. Some of the features which mark the simplicity of operation of this automatic weigher are interesting: the receiving hopper, into which material to be weighed is poured is of substantial capacity. The counterbalance for receiving hopper is adjustable to 300 pounds. The dumping chute has a maximum capacity of 2000 pounds. The machine has an unusually solid and rigid base. It is equipped with an automatic tally which registers to 100,000. There is a 1 inch by 6 inch steel bar which acts as a scale beam and also balances the dump chute. The counterbalance weight is adjustable for the required number of pounds.

Some features of its design and usefulness are also well worth noting. It weighs accurately, providing against both underloading and overloading. It costs nothing to operate, since it works automatically by gravity and its own weight. It has a capacity from 300 to 2000 pounds. An automatic tally gives an accurate record of output for any given period of time. As it is entirely automatic, no operator is required. It is simple in design and manufactured substantially to provide long life. It weighs the product at the pit, requiring no additional operations. The cycle of loading, weighing and discharging is automatic as long as the material is poured into the receiving hopper.



The Markman Automatic Weigher

An Improved Gas Cutting Torch

The Alexander Milburn Company has just placed on the market a gas cutting torch for use with illuminating and by-product gases. This torch is the result of extensive experiment and research in the utilization of a cheaper fuel, thereby reducing cutting costs materially. With city gas costing but one-thirtieth that of other gases, it can readily be seen that there is a great saving in fuel gas alone.

An outstanding feature of the Milburn torch is the superheater which heats and expands the cutting oxygen, also the preheating gases, raising the temperature of the cutting oxygen to approximately 100 degrees centigrade prior to combustion. This increases the temperature of the gases at the torch tip, increases the rate of flame propagation in the burning mixture and reduces the oxygen consumption from 25 per cent upwards. A bunsen burner, contained within the torch, burns illuminating gas which heats the cutting oxygen as it passes through a series of copper coils.

The torch is ruggedly constructed of bronze forgings and specially drawn tubing. The high pressure cutting oxygen is controlled by a thumb valve which remains in either open or closed position.

Link Belt Moves Boston Office

The Link-Belt Company will move into their new Boston office at 1103-1104 Statler Building, on November 1. This new office is located in the center of the Back Bay district, close to the Back Bay station. It is in the center of uptown Boston and is provided with ample parking space adjacent to the building. Mr. E. J. Barnell will be in charge of the office as manager.

New Osgood 1¼ Yard Shovel

The demand for gasoline and electrically driven equipment is becoming greater and guided by the success of their 1 yard gasoline and electric shovels, the Osgood Company has designed 1¼ yard gasoline or electric shovels to meet the demand for a larger machine. This machine combines with its simple design many refinements to add to its efficiency, the most important being its great structural strength and ruggedness.

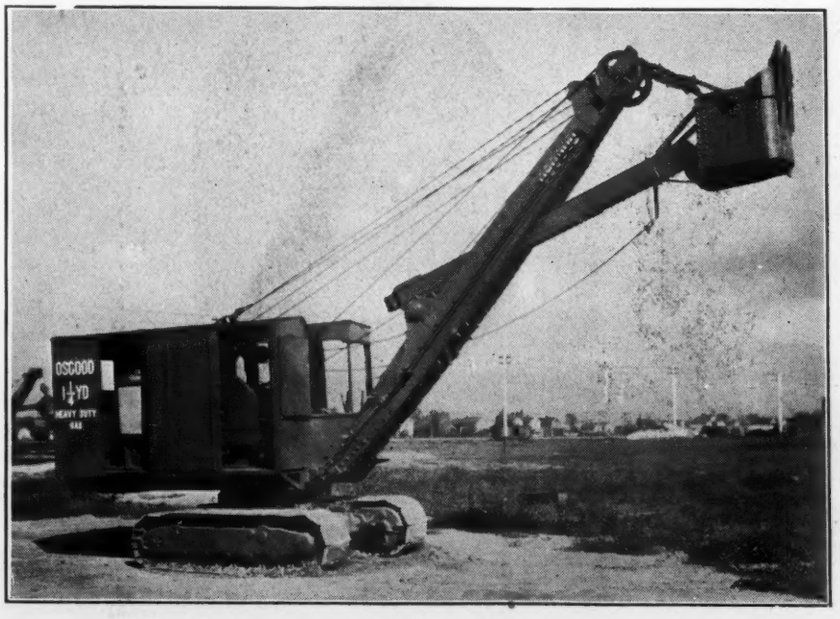
In addition to shovel work, this shovel is designed for efficient service as a crane, with hook block or clamshell bucket, and as a dragline excavator, without necessitating any changes or additions to the operating machinery, the only change being the booms and buckets. The machine is built almost entirely of open hearth and alloy steel castings, little cast iron or structural steel being used in its construction.

Only four friction clutches are used in the usual operation of the machine. These are of outside contracting band type and are easily adjusted or renewed. Gearing is by spur gears, the number being reduced to a minimum by careful design. All upper body gears have machine-cut teeth. The shovel is mounted, as standard, on an enclosed gear drive continuous tread truck of simple and rugged design.

The chief features of construction are the all-geared enclosed drive running in oil; large supporting area of tread belts, steering from the upper body, in any position, with ability to turn gradually on the machine's own center axis; and an underside clearance of twelve inches. The shovel crowding is accomplished by a simple wire rope mechanism which is self adjusting to all boom angles and involves no chains or other complications.

Among other features are the manganese steel front dipper; combination oak and steel boom handle; Special Osgood 6 cylinder gasoline engine with accessories, including self starter as standard; two-finger control of drum clutches through the Osgood Servo mechanism; an all steel house with enclosed front and a 75 gallon capacity combination gasoline tank and counterweight.

The combination gasoline tank and counterweight is made of cast iron, the center being made hollow. It is built into the upper body and becomes an integral part of the machine adding strength and solidity to the deck structure. This casting is made in one-piece with thick walls which insures freedom from leakage caused by buckling or rusting and also from the possibility of catching fire.



Osgood 1¼ Yard Shovel

Allen Now With Foote

Mr. J. M. Allen has recently joined the factory organization of the Foote Bros. Gear and Machine Company as manager of production. He was for five years manager of production of the Mosler Safe Company, Hamilton, Ohio, and later manager of production and traffic for the Goldsmith Metal Lath Company, Cincinnati, Ohio, for about one year, which position he left to accept his new position with the Foote Bros. Gear and Machine Company.

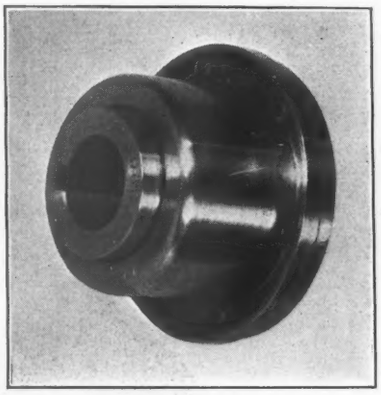
The Newark Wire Cloth Company, announce that a new catalog, to supersede their present general catalog, is now in preparation.

Falk Flexible Couplings

The illustration shows a flexible coupling manufactured by the Falk Corporation. By the use of these couplings equipment may be direct connected without danger of misalignment of the two shafts.

The construction of the coupling is simple. A tempered steel spring in segments, two flanged steel discs with slots into which the spring fits and a steel shell. The shell protects the coupling parts from dirt, acts as a simple fastener for the spring, and as a container for lubricant. As all of the elements are steel, positively lubricated, the coupling assures long life.

In manufacturing, precision methods are used with fine limits of variation. The construction provides for disconnection of coupled shafts without disturbing either machine, and alignment when assembling is reduced to the simplest operation, only a short, straight edge and an ordinary set of feeler gauges. Falk flexible couplings are made in standard sizes from 1/3 h.p. to 30,000 h.p. at 100 r.p.m. Bulletins may be obtained from the Falk Corporation, on request.



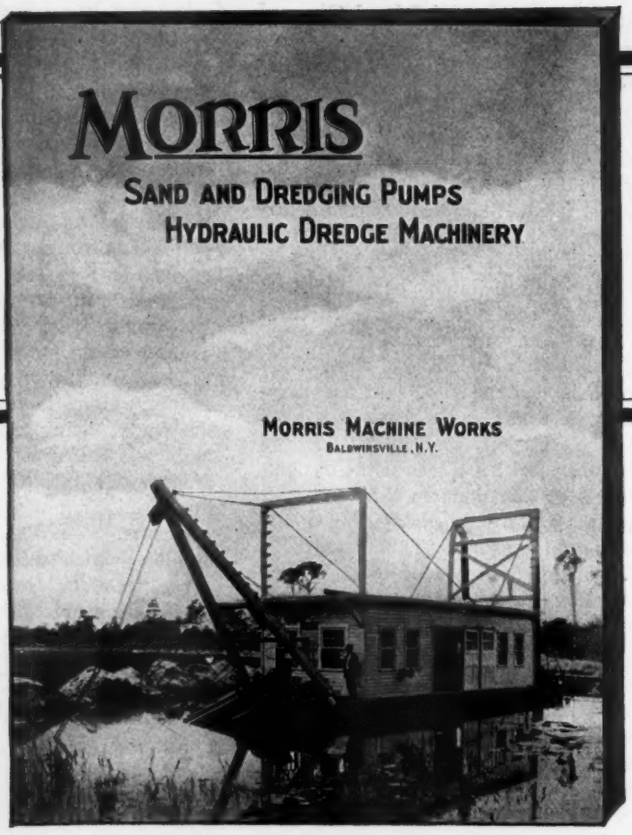
Falk Flexible Coupling

American Steel and Wire Enlarge at Birmingham

The American Steel and Wire Company has maintained a sales office in the Brown-Marx Building in Birmingham for several years for the sale of several of their leading manufactured products. This office covers Alabama, Mississippi and Louisiana. It has now been decided that, effective October 4, the scope of the Birmingham office will be enlarged for serving the trade by covering all the products manufactured by the company, and J. J. Gilmore, heretofore in charge, has been promoted to be manager of sales, with a competent force in his office to assist, and sufficient traveling representatives to keep in close and frequent communication with the trade throughout the Birmingham district.

Bulletin No. 125

on sand and gravel production, hydraulic dredging, conveying, filling, mining, etc.



Just off the press!

Write for your copy

THIS booklet contains over 125 illustrations and 56 pages of reliable information as to where, why and how hydraulic methods should be used.

It will post you on the best modern practice, what can be done with various types and sizes of outfits, and what arrangement is most desirable under many working conditions.

If you do not, but ought to utilize centrifugal pumps for handling solid or semi-solid materials, or if you want to check up performance of your equipment with what it should be, you will find many valuable hints throughout this bulletin.

Thousands of experienced Engineers, Contractors, Producers of sand and gravel, Manufacturers with handling problems and others have derived exceptional profits from hydraulic methods by means of centrifugal pumps. Many of these men have benefited from Morris advice. If you want cost and performance data, and suggestions as to your particular needs, give us details when writing for the bulletin.

12-Inch Morris Patented Manganese-steel-lined Sand Pump direct-connected to 200-hp. motor

THE "GRIZZLY" LOADER

The King of All Loaders

THE "Grizzly" works its way directly into the supply pile. There the positive feeder arms keep each bucket heaping full.

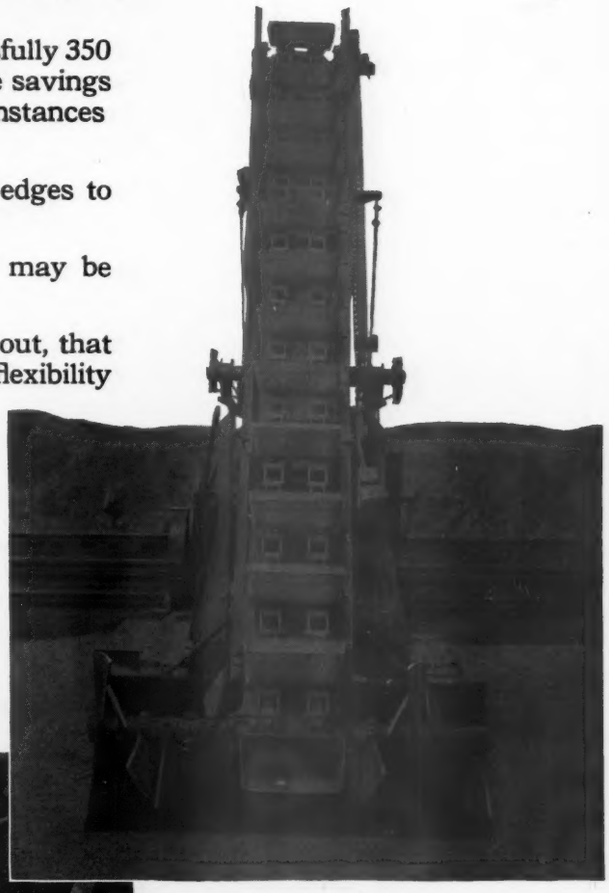
One record shows the "Grizzly" handled successfully 350 cu. yds. of building materal per 9-hr. day, while savings made over other loading methods, in some instances strike well over the $100 per day mark.

Buckets are of special design, with reinforced edges to reduce wear.

Driving, operation and care of the "Grizzly" may be handled by one man.

There are other features you should know about, that endow the "Grizzly" with the power, speed and flexibility that have won it immediate recognition as the biggest, best and most economical loader built.

Link-Belt Book No. 924 is full of useful information. If you want to know how others are loading at a fraction of former cost, send for your copy today. Return the coupon.



"There's Power in the Paw"

The "CUB"

the little brother of the big "GRIZZLY". If the "GRIZZLY" is too big and fast for your work, we suggest that you investigate the "CUB". Send for Book No. 878.

Some territory still open for Agents. Get our proposition.

LINK-BELT COMPANY 2889
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PHILADELPHIA, 2045 Hunting Park Ave. CHICAGO, 300 W. Pershing Road

LINK-BELT
Super-Capacity Crawler Loader

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I am interested in the ☐ "GRIZZLY" ☐ "CUB"

Name .....

Firm .....

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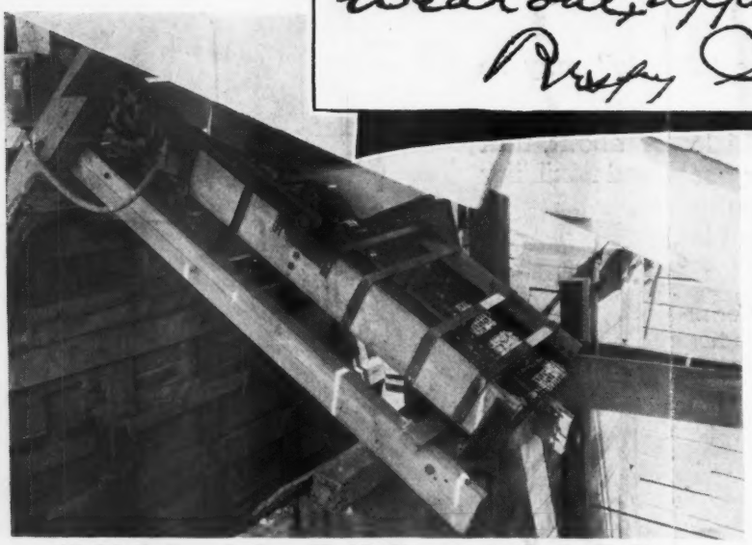
City ..... State .....

note the dates

Greenlawn Gravel Co. Col. O. 5/17/26
I have lost interest in your Rol-Man Mesh Woven Manganese Steel Screen in it does not appear to wear out — since 1924 it does not appear to wear out appreciably
Yours truly H. Reid Supt.

the report



THIS IS THE SCREEN

This User Lost Interest in ROL-MAN Screens

The ROL-MAN Double Lock Mesh Woven Manganese Steel Screen pictured above was installed in the Greenlawn Gravel Company's plant at Columbus, Ohio, in 1924. The ordinary woven steel wire screen which it replaced wore out in less than one week. Yet this ROL-MAN Screen is still in service and SHOWS NO APPRECIABLE SIGNS OF WEAR.

Are YOU making needlessly frequent screen renewals that cost you money and reduce your profits?

MANGANESE STEEL FORGE COMPANY
Main Office and Works: Richmond St. and Erie Ave., Philadelphia, Pa.
Manufacturers of ROL-MAN ROLLED and FORGED MANGANESE STEEL PRODUCTS

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TRADE ROL-MAN MARK
DOUBLE LOCK MESH WOVEN MANGANESE STEEL SCREENS

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320 S. San Pedro Street